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The London Passenger Pool

THE extraordinary care and skill which have been expended upon the preparation of the scheme for pooling all railway and L.P.T.B. passenger receipts in the London area have received their just reward with the broad approval on Tuesday of the London Passenger Transport Arbitration Tribunal. Examination of the details we published on February 22, and of Mr. Walter Monckton's opening remarks for the parties to the pool, as summarised in our issue of March 22, made it clear that every possible step had been taken to meet both the stated requirements and also the spirit of the Act of 1933. Further evidence of this was given on Tuesday by Mr. Andrew Howie, Joint Accountant of the Southern Railway, when he told the tribunal that all parties to the scheme put up their accounts and figures, which were checked by representatives of two of the other parties. If any point arose which might be the subject of a disagreement, then it was brought before a committee of accountants of all the parties. Then, should the accountants' committee be unable to agree, the matter was sent to the joint committee. Although Mr. Joshua Scholefield, K.C., Chairman of the tribunal, adjourned the hearing without agreeing to formal confirmation of the scheme, he intimated that the tribunal would approve after one or two minor modifications, upon which points the Clerk would advise the parties concerned as soon as possible.

Specialists in Transport

Few manufacturers will dispute that an article on the market is worth two in the warehouse. It is, in fact, so generally accepted that the organisation of distributive services absorbs much of the time and energy of the business world, in spite of the fact that this country possesses in the railways a specialised transport system created especially to shoulder these responsibilities. Such is the message of Mr. Geoffrey Marshall, Goods Manager, Southern Area, L.N.E.R., and Chairman of the British Railways Goods Managers' Conference, in an article recently contributed to *Marketing*. In outlining the many facilities offered by the railway companies to traders and manufacturers, Mr. Marshall referred to the ease with which the whole resources of their experience can be brought to bear on any problem. A visit to the local stationmaster establishes contact at once with an organisation offering service of a most varied and flexible kind. In addition to the carriage of merchandise, the railways provide facilities for warehousing which have enabled many traders to speed up deliveries by establishing railhead sources of supply. It is the manufacturers' business to produce and that of the railways to distribute these products to the public.

* * * *

The Week's Traffics

In the past two weeks (13th and 14th) which compare with a period in 1934 covering the Easter holidays the four group companies together had a decrease of £585,000 in passenger train traffics, but an increase of £305,500 in general merchandise, and an increase of £118,500 in coal, leaving them with a net decrease on the two weeks of £161,000. At the end of the 12th week the aggregate passenger increases were Southern £57,000, London & North Eastern £46,000, London Midland & Scottish £39,000, and Great Western £8,000. In general merchandise the Great Western had an increase of £21,000 at the end of the 12th week, whereas the decreases of the other companies were London & North Eastern £121,000, London Midland & Scottish £68,000, and Southern £63,000. Coal class traffics were generally down at the end of the 12th week, with decreases of £115,000 on the London & North Eastern, £63,000 on the Great Western, £51,000 on the London Midland & Scottish, and £39,000 on the Southern.

	14th Week				Year to date.	
	Pass., &c.	Goods, &c.	Coal, &c.	Total.	Inc. or dec.	
	£	£	£	£	£	%
L.M.S.R. ..	− 6,000	+ 90,000	+ 51,000	+ 135,000	− 82,000	− 0·54
L.N.E.R. ..	− 9,000	+ 27,000	+ 18,000	+ 36,000	− 213,000	− 1·87
G.W.R. ..	− 15,000	+ 37,000	+ 31,000	+ 53,000	− 50,000	− 0·80
S.R. ..	− 16,000	+ 8,000	+ 2,000	− 6,000	− 165,000	− 3·47

* * * *

The First Punctuality League Results

Points scored in the Punctuality League organised by the L.M.S.R. Operating Department and referred to in our issue of March 15 have now been tabulated for the four-week period ended February 23. The results appear in the April issue of *On Time*, and give evidence of an enthusiastic response in all districts to Mr. C. R. Byrom's scheme. In League I, for which the highest standard is set, the goal of 1,000 points has in no case been quite attained, although London, which heads the table to date, comes very close to it with a score of 994. No fewer than thirteen out of the 22 competitors passed the prescribed total in Division II, and we notice that the Somerset and Dorset Joint line leads on the aggregate so far, thereby giving an effective retort to graceless travellers in the West of England who were erstwhile wont to twist its initials into opprobrious epithets. An even better proportion of gains on quota is recorded in League III, where nine out

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of twelve districts passed the mark. One Scottish competitor, Aberdeen, Perth, Oban, and branches, reached the level thousand and heads its league. In the express passenger train competition for the same period, the Northern Division is first with 959 points; Central second with 910; Western third with 886; and the Midland Division fourth with 871, has improved its score by 92 points in spite of the landslide which blocked its main line near Dent from February 20 to March 6.

* * * *

Overseas Railway Traffics

The latest traffic return of the Bombay, Baroda & Central India Railway brings this company to the end of its financial year with an increase in gross receipts of £264,075. For the first quarter of the current year the Canadian Pacific has done badly with a decrease of £209,800 in gross earnings, but for the corresponding quarter of 1934 it recorded a gross increase of £782,800 Argentine railway traffics in currency continue to show encouraging increases except on the Buenos Ayres Western. For the 40 weeks of the current year the Central Argentine has an advance of 5,298,599 pesos or 7 per cent., and the Buenos Ayres Great Southern has one of 5,897,000 pesos or 6·34 per cent. At the last annual meeting of the Great Southern the Chairman estimated that an increase of 13½ per cent. might bring the ordinary stock within sight of a dividend.

	No. of Week	Weekly Traffics	Inc. or Decrease	Aggregate Traffic	Inc. or Decrease
		£	£	£	£
Buenos Ayres & Pacific ..	40th	102,779	+ 9,625	3,040,292	— 347,568
Buenos Ayres Great Southern ..	40th	162,685	+ 8,501	5,790,254	— 643,755
Buenos Ayres Western	40th	53,223	— 8,450	1,780,124	— 327,352
Central Argentine	40th	130,683	+ 11,426	4,738,009	— 560,590
Canadian Pacific	13th	587,000	— 66,800	5,287,600	— 209,800
Bombay, Baroda & Central India	52nd	148,875	— 27,600	8,268,600	+ 264,075

* * * *

The American Railway Depression

The situation of the American railway industry as a whole is exemplified in the operating statistics of the Pennsylvania system for 1934. Increased wages, prices of material, and other expenses, have reduced the average ton-mile revenue of the company to 0·887 cent, which is the lowest figure since the war and the culmination of a steady decline which set in after the general 10 per cent. rate reduction of 1921. The average for that year was 1·188 cents, and had this figure been maintained, Pennsylvania revenues for 1934 would have been nearly $85,000,000 higher. This loss of earnings represents one half of the total wages bill for last year. Such is the fruit of rate reductions, induced by the assumption that the disturbed equilibrium between the output of commodities and the money designed to purchase them can be restored only by removing weights from the industrial side of the balance. When this policy leads to a reduction of employment owing to the reduced sums available for wages, purchasing power shrinks again. The mechanism of finance has been less thoroughly developed than that of industry, and it is time it was made to fulfil its function of representing the material values of mechanical production.

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Freight Train Speeds in U.S.A.

It is estimated that in the course of fifteen years the speed of freight train haulage in the United States has more than doubled. During the five months between April and August of 1934, the average speed of American freight trains rose, for the first time, to a little over 16 m.p.h.—25 per cent. higher than the corresponding figure for 1929, and 54 per cent. higher than in 1920. It may be granted that the reduction in traffic caused by the depression has considerably facilitated this acceleration by reducing the density of main line traffic; it will be harder to maintain such speed levels as traffic once again increases, though once established, the American public will expect to see them maintained. High water mark in speed is reached by the 7.30 p.m. merchandise freight train of the New York Central Lines from New York to Buffalo, which covers the 438 miles in 10¼ hr., at an overall speed of 42·7 m.p.h., inclusive of four intermediate stops at which wagons are detached and picked up. Typical of longer distances is the fast freight service of the Illinois Central RR. over the 921 miles between Chicago and New Orleans, covered in 41 hr. inclusive of all stops. Express freight trains are run over many American systems on schedules as exacting as those of the fast passenger trains, and maximum speeds up to 60 m.p.h. are by no means uncommon on these freight services.

* * * *

New German Speed Records

The summer timetables of the German State Railway reveal some extraordinary speed developments. The promise, made by Dr. Dorpmüller some time ago, to connect Berlin with the chief cities in the provinces by means of high speed diesel railcars is being fulfilled, and the business man will be able to travel further afield and back the same day than has ever been possible before. To accomplish this, the fastest regularly booked start-to-stop speeds in railway history are to come into operation on May 15, and even the hitherto fastest train in the world, the 77½ m.p.h. Flying Hamburger, will be left well down the list. Top place will be taken by a flying Hanoverian with a start-to-stop booking from Berlin to Hanover of 82¼ m.p.h. This particular service will also break the record for long distance high speed running, for it will cover the 720 miles from Cologne to Berlin and back in 627 minutes, exclusive of the wait at Berlin from 12·20 to 7·11 p.m., but inclusive of 13 intermediate stops, at an average of 69 m.p.h. These new German services are to be no mere spectacular achievements; as will be seen from the article on page 709, they have been designed on a comprehensive scale, covering directly, or by convenient connections, most of the great German centres of population.

* * * *

Anglo-Indians on Indian Railways

The debate in the House of Commons on April 4, upon the employment of Anglo-Indians on the Indian railways, calls for a brief explanation of their position. It may safely be stated that the Anglo-Indians are the backbone of most systems, for the great bulk of the upper subordinate staff in the locomotive departments as well as a fair percentage in the traffic and other departments are recruited from that community. The railway battalions of the India Defence Force—corresponding to the Territorials at home—are almost entirely composed of Anglo-Indians on most railways, and it is to them that Government at present looks in case of strikes, riots and other emergencies to secure the vital transport arteries of the country. The Anglo-Indians work and associate with the European subordinates, who are often ex-soldiers, and it is usual to find that running shed and workshops foremen, assistant foremen, fitters-in-charge, mail, and a large percentage of the passenger drivers and many firemen too, are drawn from one or other of these two communities. Most of the station superintendents and their assistants, and the senior stationmasters and passenger guards are also Anglo-Indians on the larger railways, as well as a high percentage of the permanent way and signal and interlocking inspectors. On some lines, too, there are

many Anglo-Indian officers. It is obvious, therefore, that this community is one deserving the gratitude and fullest support of the British Empire.

* * * *

Railway Accident Inquiries in 1934

As we believe that the reports on all the accidents that were inquired into last year have now been published, it may be recorded that 10 train accidents were investigated. That figure compares with 19, 13, 15, 8 and 18 respectively in the five previous years of 1929-1933 inclusive, and with 25, 18, 28, 26 and 20 in the five years 1920-1924, *i.e.*, ten years earlier. The outstanding feature of last year was that no derailments were inquired into—the Wormley derailment was the sequel to a collision. All were collisions, and five of them were between two passenger trains, one between a light engine and a passenger train, and one between a passenger train and a standing freight train. Another case was a light engine running into a motor trolley, and there were the two cases of passenger trains striking road motor vehicles at occupation crossings, one involving a derailment as already mentioned. In one of the passenger train collisions six passengers and three servants were killed and in another ten passengers and one servant. The derailment at the occupation crossing caused the death of two servants, and in the other accident of this kind one of the occupants of the road vehicle was killed. The motor trolley collision killed one servant.

* * * *

Level Crossing Accidents

An example of the disastrous results that may follow a collision between a train and a motor vehicle at an occupation crossing was provided by the accident at Shepreth on August 17, 1928, in which an express passenger train was derailed and the fireman killed. Another accident of the same kind occurred on May 14 of the following year near Beltonford signal-box between Dunbar and East Linton. Fortunately, however, there was no derailment and no personal injuries on the train, although the driver of the road vehicle was killed. The train concerned was the Flying Scotsman, which ran into an unladen motor lorry at a speed of 60 m.p.h., and, although the report of Colonel Mount, who inquired into the accident, did not say so, there might have been very serious results, as the line at that point is on a high embankment. The point of present interest is that, as related in our summary of the report on page 871 of THE RAILWAY GAZETTE of November 29, 1929, in order to " to ensure, as far as practicable, that a proper feeling of responsibility is impressed upon the minds of users, it has been customary in this—the Southern Scottish—area of the company's system to padlock the gates of occupation crossings and to place the keys in the custody of the owner concerned . . . . . The tenant farmer of North Belton crossing has refused in the past to accept the keys and these are the only gates of the kind in this area that are not so locked."

* * * *

New L.N.E.R. Restaurant Cars

The L.N.E.R. has, during the past several years, achieved an enviable reputation with the travelling public for the excellence of its dining and sleeping car accommodation, and the new first class electric restaurant cars recently completed at the company's Doncaster works and since placed in regular service on Tuesday between King's Cross and Scotland, will doubtless add something further to the satisfaction of those who use them. Criticisms of restaurant car appointments in the past have nearly always included condemnation of the seating arrangements, the chairs or seats being cramped and often uncomfortable. In these new vehicles, however, each passenger is provided with an independent armchair representing in its design a new departure in railway equipment. The chairs are of the wing easy type in which every point affecting the traveller's comfort has been studied both for ease in dining and relaxation. Their position and height obviate the necessity of leaning forward without support for the back, which sometimes impairs the pleasure of dining in a train. A diffused lighting system is installed and both the warming and ventilating arrangements are carefully planned. The all-electric kitchen is not the least noteworthy feature of these admirably designed and equipped railway vehicles.

* * * *

Deceptive Decoration

The problem of imparting a more spacious appearance to rolling stock without limiting its seating capacity or exceeding the loading gauge is one which belongs to the province of the internal decorator. An excellent example of how the traveller's eye can be beguiled in this way is furnished by the new L.N.E.R. restaurant cars referred to in the previous note. Emphasis is given to the vertical lines of the wall panels by picking them out in a contrasting colour, so that instead of concentrating on the side to side dimensions of the car, the mind takes in the whole sweep of the walls and gains an impression of width. Actually, the cars are only three inches wider at the waistline than the ordinary type. An appearance of added height is given by concealing the true junction between walls and ceiling behind a strongly defined cornice situated somewhat higher than usual. The doors have been raised, and this feature is accentuated by an upward curving line above the lintel. The internal decoration has been carried out by White Allom & Company, who also designed the interior appointments of the L.N.E.R. Royal trains.

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Securing Tyres by Welding

In the course of the discussion on a paper by Mr. J. R. Sedgfield before the South American Centre of the Institution of Locomotive Engineers, on machine tooling methods and machine shop reorganisation, a speaker remarked that the author had described electric welding as an unsatisfactory method of securing tyres in railway practice. He explained that the danger which arises when this method is applied to the body of the tyre lies in the rapid abstraction of heat from the neighbourhood of the weld by the surrounding mass of metal, which produces local hardening and cracks. In his experience, however, a method that had proved successful and which had consequently been rapidly extended to all motor bogie tyres on electric rolling stock, was to confine the heating of the weld to the lip of the tyre where the cross section of the metal is thin and so isolated from the body of the tyre that rapid cooling of the welded portion does not take place; damage to the tyre is thus avoided. This practice has been in vogue on a leading South American railway for nine years and there has never been a tyre failure which could in any way be attributed to electric welding. The contraction allowance on the tyres is 1 in 750, and the tyre material is 62 tons tensile stress. The tyres so treated number 760, and although cracked flanges due to the use of flanged brake blocks, and overheated tyres caused by brake defects which sometimes result in loosening the tyre and shearing through the well, have, it is true, occurred, no cracks have ever developed in the vicinity of the welds.

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Iraq Railways

THE policy of reduced fares whereby the Iraq Railways have sought to establish an equal footing with road competitors was rewarded by a continued increase in the number of third class passengers carried during the year ended March 31, 1934. Reductions were inaugurated at the end of 1931 and resulted in an increase of 82·4 per cent. in journeys of this class in 1932-33. In the course of 1933-34, fares were further lowered where possible, and the number of journeys again rose by 23·2 per cent. over the preceding year. Receipts from this traffic in the period under review were 110,529 dinars,* or better by 4,978 dinars, while the total gain compared with 1931-32 was 24,637 dinars. Over the same three-year period, third class passenger journeys increased by 124 per cent., but this incurred only a very slight rise in train mileage, owing to accommodation formerly almost unused being now filled to capacity. Passenger earnings from all classes were 138,022 dinars, compared with 134,563 dinars, and represented 26·3 per cent. of the total traffic receipts. Goods traffic receipts improved by 24,840 dinars. The following comparative figures are shown in the report:—

	1933-34	1932-33
Ton-miles	110,795,376	96,706,940
Average haul, miles	212·28	206·53
Number of passengers	1,799,542	1,462,447
Goods, tons	596,406	521,742
Operating ratio, per cent. ..	93·9	94·3
	dinars	dinars
Total earnings	524,037	496,055
Gross working expenditure ..	491,986	467,701
Net earnings	32,051	28,353
Net surplus	34,877	32.448

The transfer of the railways to the Iraq Government has not yet been implemented, although it is understood that negotiations continue. During the year reviewed in the report, passengers and receipts by the Simplon-Orient route to Persia *via* Iraq have increased to a marked degree, and this is attributed to the attractive reductions which have been made in fares. To improve the road service between Kirkuk and Tel-Ziouane, the administration purchased a fleet of Rolls Royce cars towards the end of the financial year 1932-33. The advertisement value alone of these vehicles is thought to be considerable, particularly in view of the efforts being made by the Soviet authorities to popularise the route to Persia *via* Russia. The purchase has been no less justified by the commercial results, for the receipts of the road service increased from 2,941 dinars to 4,904 dinars in 1933-34. Further improvements in passenger amenities have been afforded by experiments carried out in connection with the ventilation of coaches and the exclusion of dust by conditioning and cooling the air. Two more bogie saloons were fitted during the year with apparatus for this purpose, incorporating recent developments, and three more bogie coaches have been equipped with frameless, dust-proof windows. There were 57 locomotives in commission during 1933-34 compared with 60 previously. Main line types averaged 3,130 miles a month.

The demand for faster services in Iraq has not in the past been great, and speeds have been limited by the poor quality of water available for the locomotives. Now, however, that fares have been reduced to their lowest economic levels in order to meet road competition, considerations of further inducements to travel will have to take the factor of speed into account. There are today new types of locomotives in service which require the minimum of water, and it is intended to use these in conjunction with comparatively light trains to inaugurate a 14-hr. service between Baghdad and Basra. Even so, it is considered that an air service is necessary to provide the speed of transport required by the business community, and such a service could most appropriately be furnished by the railways. In concluding his report, therefore, the Director of Railways proposes the formation by the Iraq Government of an Iraq national air company, over which it would have financial control through the intermediary of the railways.

* The Iraq dinar is nominally £1 sterling. Until April 1, 1932, when the new currency was issued, the unit was the rupee.

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Agreed Charges for Live Pigs

CONSIDERABLE publicity has recently been given to objections lodged against the proposal that the railway companies should undertake the conveyance of all live pigs from producers to registered bacon curers during 1935 at an agreed charge, and it is therefore necessary to bear in mind the circumstances in which the arrangement was first introduced. By the Agricultural Marketing Act, 1931, the Minister of Agriculture was authorised to approve schemes for regulating the marketing of pigs and bacon produced in Great Britain, and in the following year he appointed a commission for the purpose of preparing such schemes. This commission subsequently intimated to the railway companies that it proposed recommending the establishment of a marketing board to organise production and standardise the price of bacon and that, as part of the scheme, it was desirous of standardising transport cost of the live pigs from farm to factory. In 1933 the Minister issued the Pigs and Bacon Marketing Schemes (Approval) Orders which provided for the conversion of live pigs into bacon by registered curers and the transport of pigs to the various bacon factories. After somewhat lengthy negotiations between the boards, curers, and railway companies, the boards accepted an agreed charge of 1s. 8d. net a pig on the understanding that the whole of the pigs embraced in the scheme, apart from specific exceptions, should be conveyed by railway. To meet cases of hardship, however, the railway companies agreed to exempt from the scheme pigs produced at places not more than five miles from the curer's premises and also pigs produced at places between five and fifteen miles from the curer's premises where throughout road conveyance could reasonably be required.

In practice the system did not operate satisfactorily as it was found that many curers receiving bacon pigs also dealt with pigs for pork which were produced locally and were not subject to the charge. Difficulties arose, therefore, in ascertaining the exact number of pigs which were rightfully the subject of the agreed charge. As the result, the railway companies negotiated with the Pigs and Bacon Marketing Boards towards the end of 1934 for the introduction of a much wider and more comprehensive scheme under which they would secure the conveyance, either by rail or road, of substantially all the pigs going to curers, whether they were intended for bacon or pork. The agreement with the boards was for the conveyance by railway of pigs from producers to the curer's factory at a charge of 1s. 6d. net a pig, station to station or siding, and 2s. 1d. a pig for those animals conveyed throughout by road. In certain cases, however, it was agreed that producers might be allowed to perform the road conveyance service, for which they were to be allowed a rebate of a part, but not the whole, of the 2s. 1d., in respect of the services not performed by the railway companies. It is within the competence of the boards to prescribe the terms of contracts which registered bacon curers should make with regard to transport and they, in fact, did so in this case. Accordingly applications for the agreed charge had to be signed by the producers and sent to the railway companies and something like 500 were signed towards the end of 1934 in order that the applications might be lodged with the

Railway Rates Tribunal to enable the charges to operate as from January 1, 1935.

Shortly after most of the agreements were signed, various curers represented that they had signed the forms under a misapprehension or under protest as they felt that the arrangement should not apply to pigs intended for pork. While the companies were unwilling to accept such a sweeping modification of the arrangement, they offered to be represented with the boards on a standing committee to deal with individual cases of hardship. The Parliamentary Committee of the Co-operative Congress and the National Federation of Meat Traders' Association were not satisfied, however, and lodged a complaint with the Minister of Agriculture against the conditions of the proposed charge, urging that their complaint should be brought before a Committee of Investigation under the provisions of the Agricultural Marketing Act, 1931. The Minister assented to this request and arranged for the necessary inquiry to be held. Meanwhile, on February 19, the railway companies took the opportunity of explaining fully to the Railway Rates Tribunal the reason for not proceeding with the large number of applications for these agreed charges which had been lodged for some time, and that body adjourned further consideration of the proposed charges pending the decision of the Committee of Investigation. The Minister of Agriculture has now advised the Bacon Marketing Board that the committee has decided that the flat rate transport system is necessary for the operation of the pigs and bacon marketing schemes and that, while under such a scheme some curers are paying more for transport than formerly, the board was acting in the best interests of the pig industry as a whole in agreeing to the scheme. In these circumstances the railway companies will ask the Railway Rates Tribunal at an early date to resume consideration of their application for the sanction of these agreed charges which will relate to the conveyance of probably two million pigs.

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Railways in East Africa

IN an editorial published in THE RAILWAY GAZETTE of February 10, 1933, we outlined the recommendations in Mr. Roger Gibb's report upon railway rates and finance in East Africa. Also in the issue of April 28 of that year, an editorial note gave some idea of the reception that had been accorded to the report in Kenya. Now, just two years later, the conclusions reached by the Secretary of State for the Colonies in connection with the report have been received. These appear completely to negative Mr. Gibb's principal recommendations, which are that (*a*) the post of High Commissioner for Transport, Kenya and Uganda, should be abolished, (*b*) control of the Kenya and Uganda Railway should be exercised by a small board in London, and (*c*) the whole of the traffic from the Moshi-Arusha area should pass via the Voi-Kahe line to Kilindini, that the Kahe-Buiko section of the Tanga line should be abandoned and that the Buiko-Tanga section should be transferred to private operation. The Secretary of State considers that (*a*) and (*b*) should not be accepted and that no effect should be given to (*c*). He adds that he does not think it necessary to discuss many of the other recommendations, as a number of them depended upon the acceptance of Mr. Gibb's proposal to establish a Kenya and Uganda Railways board of directors in London.

As regards the more important of the other recommendations, the Secretary of State agrees with the resolution of the Governors' Conference regarding the policy of general finance. This resolution is based on the opinions of the railway advisory committees in the two territories and agrees that the railways must be run on business lines such as will build up sound budgets with adequate reserves and renewal funds and will not countenance development that would ultimately be detrimental to railway interests. Concerning rating questions, the Secretary of State agrees with the Governors' Conference that, in effect, rates should remain as they are, provided they are not obsolete, and that, in any case, appeals against them should be decided by the High Commissioner for Transport. With regard to the assimilation of a rating policy as between the two territories, uniformity is urged as is also avoidance of any semblance of competitive rating. In case of disagreement, appeal to the Secretary of State is approved. The views of the Governors that there should be no change in the constitution of the railway advisory committees or in the control of the harbours are shared by the Secretary of State. He also approves of the Governors' resolutions that the General Manager of the Tanganyika Railways should remain a full member of the Tanganyika Legislative Council, and that the General Manager of the Kenya and Uganda Railways and Harbours should in principle be a member of the Kenya and Uganda Councils only for matters affecting railways, though he should remain a full member of the Kenya Council for the present.

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Locomotive Power

ALTHOUGH it is the oldest and the simplest of the agents devised for hauling loads in wheeled vehicles, the steam locomotive remains in some respects the least understood of machines. Its capabilities, like those of electric and internal combustion units, are related in some way to the dimensions of its various parts and to the conditions under which it is set to work, but the necessary relationships involve a host of factors, and to this day the formulæ relating to the steam locomotive are either very imperfect or very limited in application. The result is that while railway services to be worked electrically or with internal combustion engines can be planned, and are planned, with exactitude and so as to derive the greatest advantage from the means employed, those to be worked by steam locomotives are still organised almost anyhow. To determine the ideal timings for steam trains and to lay down the most suitable programme for steam locomotive control over a given route it is necessary, in the continued absence of any reliable formula for the steam locomotive to undertake first of all extensive experiments on the track on the type of locomotive to be used. Work of this kind has actually been carried out on the Continent, and there the systematic planning of steam operated services is consequently within the realms of practical possibility. Running trains to within a few seconds of a given timetable is practised as well in this country as elsewhere, but in many instances the timetable itself fails to give the locomotive a chance of showing its strong points. Time keeping is assured by allowing steam trains three and four times the interval commonly allowed to electric trains at stations, and by granting a degree of latitude to the driver in the handling of his engine which must be accounted little short of barbarous when due consideration is given to the effect of the personal element on maintenance and on fuel and water consumption.

In old fashioned designing a semblance of propriety was given to rather half-hearted incursions into the realms of theory by the introduction of what was called euphoniously enough the safety factor. Today a discrepancy between theory and practice necessitating the multiplication of a theoretical figure by five or six would call for and receive critical examination. Competition for business is far too keen to permit the addition of

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pounds of metal to any part where ounces would do. Train operation no less than manufacturing calls for a precise understanding of the factors affecting the end to be attained. A railway is a factory producing ton-miles and the output is sufficiently vast for it to be a matter of some concern if the cost of transport is a fraction of a farthing per ton-mile higher than it need be, due consideration being given to public demands in the way of speed and stopping places. There is nearly always a best way of doing things and latitude of any kind is to be deprecated where the proper course of action has been made manifest.

How far the performance of steam locomotives is from being the cut and dried result of official planning is made evident by the enormous amount of train timing and train watching that goes on where steam is the motive power. In our contemporary, *The Railway Magazine*, locomotive form is discussed as if locomotives were indeed living and temperamental creatures like race horses, instead of mere machines. The electric train which is run to a far more rigid programme, being far better understood, gains little or no attention from outsiders. Further evidence of the scanty understanding of the steam locomotive is afforded by the regularity with which even railway officials are surprised by exceptional runs. A train is late, or is run with a different type of engine, or with some change in the load, and runs are achieved which show characteristics of the engine never before revealed, and therefore never suspected. What the prevailing ignorance entails in the way of wasted opportunities and wasted materials no one can say, but there can be little doubt that tests carried out with the object of determining precisely and completely the characteristics of locomotive engines up to the limit of their capacity could be made to pay for themselves again and again by the rational utilisation of their results. In this issue we publish the first of a series of articles dealing with the measurement of locomotive power and with the possibility of estimating it from design particulars. The problem has engaged the attention of many engineers and it is the purpose of the new series to collect results which have hitherto been available only in separate publications and in several different languages, and to examine them critically. In the final articles the most recent researches will be described and some indication will be given of the way in which the present somewhat unsatisfactory state of affairs could be remedied.

LETTERS TO THE EDITOR

(The Editor is not responsible for the opinions of correspondents)

Locomotive Performance in France

Nigerian Railway, General Manager's Office,
Ebute Metta, March 15

To the Editor of The Railway Gazette

Sir,—In regard to the two articles on this subject which appeared in your issue for February 8, it would be of interest if all the fuel consumptions in terms of train miles, and of gross ton miles of train weight, were given, together with an analysis of the coal used.

I note that the observer on the footplate of the Paris-Orleans-Midi train states that " when the engine was working at its hardest, despite the speed, the two jets from the Kylchap blast pipes rose fully fifty feet in the air." This looks like a high back pressure. I do not think that such an exhaust has ever been seen coming from one of the Great Western Railway's 4-cylinder simple locomotives, however hard or fast they were working.

Some years back, when the Great Western Railway was experimenting with the French four-cylinder compound Atlantic locomotives, I remember the late Mr. H. C. King—then Works Manager at Swindon—saying that some of their investigations had shown the exhaust steam in the low pressure cylinders, under certain conditions of working, to be travelling slower than the pistons and consequently propelled out of the cylinders.

Yours faithfully,
G. V. O. BULKELEY,
General Manager

[The correspondent who furnished us with the details from which the articles referred to were compiled did not provide data regarding fuel consumption. We have, however, some figures of fuel consumption by one of the Paris-Orleans rebuilt 4-8-0 express locomotives, which show that when working a 745-ton train on a fast schedule with frequent stops, the coal consumption was about 0·15 lb. per trailing ton-mile, and 0·122 lb. per gross ton-mile. On test runs at an average speed of about 73 m.p.h. from start to stop over distances of about 90 miles, hauling a train of 635 tons, the coal consumption was 0·14 lb. per trailing ton-mile and 0·11 lb. per gross ton-mile. These figures are based on the coal actually fired during the runs. The coal was from the pits in the Lille district, and the proportion of briquettes was about 1 : 6. Although we give these figures it must be borne in mind that they cannot be used to form anything like an accurate assessment of the efficiency of the locomotive without a knowledge of gradient and other special conditions.

A possible explanation of the conspicuous exhaust described may have been a rare combination of air and train velocities at the particular moment of observation. Our own experience is that the exhaust of these rebuilt Paris-Orleans locomotives is very light even when working hard.—Ed. *R.G.*]

Immortal Locomotives

112, Nithsdale Road, Pollokshields,
Glasgow, April 8

To the Editor of The Railway Gazette

Sir,—I have just been reading your leader on page 223 of your February 8 issue (your journal reaches me after passing first through an office, and then through a retired locomotive engineer), and I was much interested in your note on the old Midland Railway compounds, as I worked for months on the original designs, and rode more than twenty thousand miles on the first two built, Nos. 2631 and 2632 as they were then; afterwards renumbered 1000 and 1001. Part of my riding was on the footplate, but much of it in front of the chimney (in a special shelter, of course), taking indicator diagrams, &c.

It may be of interest that, soon after being put into service, in 1902, working express trains between Leeds and Carlisle, with an average of 160 tons behind the tender, old No. 2631 did 1,921 miles = 539,551 gross ton miles on a coal consumption of 0·124 lb. per ton mile, and a water consumption of 1·02 lb. per mile. No. 1005 (original 1000), in 1906, did 990 miles = 357,480 gross ton miles (240 tons behind tender), on 0·113 lb. coal and 0·92 lb. water per ton mile. Later on, in 1913, No. 1040 with superheater, with 214 tons behind tender, did 1,951 miles = 649,683 gross ton miles, on 0·068 lb. coal and 0·62 lb. water per ton mile, working London-Leeds expresses.

The above figures were all during ordinary working, with weighed coal and measured water. 80 m.p.h. was quite often reached, and 93·94 m.p.h. was shown one day by the time-distance recorder, with electrically operated time pen ticking $\frac{1}{5}$th sec. on a tape moving about 2 ft. a mile, and driven from bogie wheel. I think it will bother any of the latest modern engines to better these results.

Yours faithfully,
P. H. PARR

PUBLICATIONS RECEIVED

Mathieson's Pocket Books for 1935.—We have received from F. C. Mathieson & Sons, 16, Copthall Avenue, E.C.2, three useful pocket handbooks of financial and statistical information. "Mathieson's Handbook for Investors for 1935" (5s. net) gives in its 355 pages a concise record of Stock Exchange prices and dividends of selected securities for the past ten years. There are 36 pages in the railway section, enumerating the principal British, Colonial, Indian, American, and foreign companies. Omnibus and tramway companies are also dealt with. A perpetual yield table and other useful information for investors is given at the end of the booklet, which is compiled to include data up to the end of November, 1934. Companions to this volume are "Mathieson's Traffic Tables" and the "Investors' Pocket List of Reference Tables," each issued at one shilling. The traffic tables are for use from January to June and show weekly results in 1934, and for the present year to the end of February on the four British group companies and British-owned railways abroad. The 1933 figures are also given in the case of foreign systems. Tables of yields, income tax, and money equivalents of fractions and decimals are among the information in the other booklet.

Structural Design in Steel. By Thomas Clark Shedd. London: Chapman & Hall Limited, 11, Henrietta Street, W.C.2. 8¼ in. by 6 in. 568 pp. 368 Figs. Price 25s. net. Postage 9d.—This is an extraordinarily useful book for those engaged in the design of steelwork. The text has been restricted to a discussion of the fundamental principles underlying all design in structural steel, but a number of sets of design calculations have also been included to amplify and illustrate the subject matter. Some of these are practically complete for a given structure, and should prove useful in showing designers a clear but concise method of recording their work. The book is essentially for those who have mastered the elements of the theory of structures and of the strength of materials, but no advanced knowledge is assumed, nor is complicated mathematics involved.

All structural members are divided into beams, tension members, compression members or a combination of these, and each group is considered in detail. In the first class, although the full analysis is shown, the common method of design, with the assistance of load capacity tables published by various steel manufacturers, is also given. The discussion on the stresses in plate girders is very good, and that section dealing with the nature of shear and its effect on design is specially recommended.

Tension and compression members are also thoroughly treated, including cases in which bending stresses are involved. A general discussion on the necessity for wind bracing in high buildings is given, but a detailed treatise is beyond the scope of this book. In several places, care must be taken to differentiate between stress on unit area and load, as these are sometimes indiscriminately referred to as "stress."

The book has a short chapter on welding, but as this is a large and difficult subject there is not room to treat the subject well, and it must be read with caution. The inclusion of some standard American specifications completes a work which so thoroughly combines theory and practice that both students and engineers should find it an asset to their library.

General Survey of Conditions in Manchukuo. Prepared by the Dept. of Foreign Affairs, Manchukuo Government, Hsinking. 8¾ in. × 6 in. 50 pp. Paper cover. Communications to the Bureau of Information and Publicity, Foreign Office, Hsinking, Manchukuo. Price not stated.—Some of the remarkable developments which have taken place in this State since its establishment on March 1, 1932, are outlined in this little book, but in it the subject of railway expansion and reorganisation neither occupies a position nor is it allotted space commensurate with its truly phenomenal magnitude. However, the total lengths of the various systems—presumably open for traffic in November last—are given as:—North Manchuria (the former Chinese Eastern), 1,721 km.; South Manchuria, including lines in the leased Kwantung territory, 1,129 km., and State 3,726 km., giving a grand total of 6,576 km. These figures do not appear to be quite correct for a date so recent as November, but in any case, in view of the constant additions made to the State Railways, this is perhaps, unimportant. A table of new lines opened in 1933 and 1934, with the dates of opening and lengths, follows this summary.

Train Cruises on the Continent.—Rail cruises to Budapest providing hotel accommodation *en route* at an all-in price little higher than the first or second class fares form the subject of a booklet received from Dean & Dawson Limited. The tours last 16 days, and there will be four departures between June 8 and August 31 next. Two itineraries are shown—one going outwards *via* Montreux, Bolzano and Vienna, to return by way of Munich and Strasbourg, and the other *via* Cologne and Prague, returning *via* Vienna, Nuremberg, and Frankfort. The prices of 25 guineas for the first itinerary and 27 guineas for the second include first-class hotels and reserved accommodation throughout. Another folder from the same source describes an Italian train cruise visiting Turin, Rome, Naples, Florence, Milan, and Stresa. Fourteen days are occupied, and there will be three departures during the summer. A fully inclusive charge of 26 guineas allows second class travel on the Continent and third class in England.

Mysore. Bangalore: Government Soap Factory. 11¾ in. × 8¼ in. 31 pp. Fully illustrated, with folding map of Mysore railways. No price stated.—This attractive publication is full of illustrations of places and incidents of interest in the State of Mysore. Notes for tourists include paragraphs upon the size—equal to that of Scotland—of the State, its goldfields and iron-works, forests and sandal-wood oil factory, this oil being the basis for most perfumes. Other features mentioned are big game shooting and elephant-catching khedda operations, the Canvery falls, 400 ft. high, and other scenic attractions, the battlefield of Seringapatam and great hydro-electric power plants, a speciality of the State.

The Man in the Mask.—This is not the title of a new mystery novel, but of an illustrated handbook, published by Metropolitan-Vickers Electrical Co. Ltd., to put forward the advantages of arc welding. The "Man in the Mask," in fact, puts nothing on the spot beyond high production costs, and even for this he apportions some of the credit to his accomplices—Metrovick electrodes. The concluding pages of the book show diagrammatically typical welded joints and give an abridged description of the types of electrode available. Various types of welded work are illustrated, including the L.N.E.R. 2-8-2 locomotive *Cock o' the North*, with its all-welded tender.

Aluminium Alloy Products.—We have received from the Reynolds Tube Co. Ltd., of Birmingham, a descriptive and illustrated catalogue of tubing, extruded and drawn rods, bars and sections in high strength aluminium alloys, including Hiduminium. This is a new material which is claimed to possess the attributes of low weight, resistance to corrosion and strength to a greater extent than any other light alloy at present available. It is, therefore, specially suited for the production of fittings on automatic or capstan machines, such as bolts and nuts, screws, hubs, ball-bearing races, and so on. Its good machining qualities particularly recommend its use where such components have to be turned out at high speed. Hiduminium also has the advantage of retaining its strength and hardness under high temperatures. These and other characteristics are shown in a series of coloured graphs. A number of full-page illustrations give the catalogue a handsome appearance and the various diagrams are of excellent clarity. It is bound in a serviceable loose-leaf cover, working on the push-button principle, which will assist in the presentation for reference of the large amount of information contained.

XUM

THE SCRAP HEAP

When the vicar called on Mrs. Moggs, he found her much perturbed. "There's something fishy about our Mary's young man," she told him. "He's got a book and he keeps showing bits of it to her, and then they starts laughing and whispering together."

"Dear me," replied the vicar, looking serious. "Have you any idea of its title or author?"

"Yes, I've managed to see that much," she answered with satisfaction. "It's called 'Holidays, by L.M.S.'" —*From the "L.M.S. Magazine."*

* * *

OBITUARY EXTRAORDINARY

Died, on Friday last, the London and Leeds mail coach, in the 56th year of its age. It first commenced running (through Nottingham) on July 26, 1785, and ceased on August 28, 1840. The immediate cause of its dissolution is the spread of railways.—*From the "Lincoln Gazette," September* 11, 1840.

* * *

Fifty years ago *The Electrician* of March 7, 1885, contained an account of an ingenious proposal put forward by a Mr. Phelps, of New York, for telegraphing to moving trains—a copper conducting wire to be laid in the centre of the track, with another wire laid along the floor of a railway coach. The signals sent along the track wire were to be received on the train by means of the current induced in the circuit on the coach.

* * *

During the period of civil war she (Countess Alexandra Tolstoy) made frequent journeys, as a rule in indescribable conditions of overcrowding and filth, between Moscow and Yasnaya Polyana, where Tolstoy's widow was still living. On one such occasion there was room to move in the railway cattle truck only because a few people cared to mingle with the cases of typhus travelling from the south, without medical attendance of any kind, to Moscow. On another occasion she set herself the task of finding a seat on the train to Yasnaya Polyana for her aunt Tanya, an old lady of seventy. Since several people were often killed in the stampede which followed the mere appearance of the train on the platform, ordinary methods would not do. She hurried to the stationmaster before the arrival of the "Maxim Gorky," a proletarian train with only fourth-class accommodation:—

"Comrade!" I said, "Tolstoy's sister is taking the next train and she is an old woman. She was Natasha Rostov in 'War and Peace.' Please give her a seat in the train. She is going to Yasnaya Polyana." The comrade blinked at me and gave no sign of understanding. If I had been talking of Karl Marx's sister, the result would have been exactly the same.

At the last moment she discovered a Pullman car, reserved for Commissars. The name of Tolstoy was not without effect, and her aunt wrote afterwards that the comrades had been most cordial, though disappointed that she was not Tolstoy's sister but only his sister-in-law.—*From "The Times Literary Supplement."*

* * *

LIGHTER MOMENTS AT DINGWALL

As might be supposed, the long periods of inactivity which so frequently occur at stations in the far north of Scotland tend to be monotonous for the staff. Partly from a kindly desire to relieve this monotony, and partly, no doubt, with the intention of preserving their own dignity, two sheep recently provided the following comic relief at Dingwall. With a view to consigning them by the next up train, the foreman had locked them in—of all places—the ladies' waiting room. No sooner had he returned to the other platform, however, than one of the sheep reappeared on the platform with a resounding crash through a pane of glass considerably smaller than itself, and made off behind a convenient assortment of goods wagons. A long chase ensued, led by the foreman and the owner's sheep dog, the latter's enjoyment far surpassing the former's anxiety. The miscreant, eventually captured, then had to suffer the far greater indignity of being tethered to a lamp post, to which it objected most strongly. Just as order had been restored, as it seemed, this sheep's companion in captivity decided that it might also have a "run for its money," and duly appeared through the broken pane without knocking out so much as a fragment of glass. A "dash for Inverness" culminated a good quarter of a mile from the station in a delightful game with the dog round and round a Jones 4-6-0 goods engine. In the end the same punishment was meted out to the second offender as the first.

The accompanying photographs are of an unusual piece of permanent way work, and we invite readers to send us notes upon it

"Big John" Winstead of the Norfolk & Western RR., U.S.A., who is hailed by the "Railway Age" as "the largest railroader." He weighs 400 lb., wears a 21 collar and an 11 shoe

* * *

There were once two friends who, after a lapse of 30 years, met quite by accident on Doncaster railway station. After the first expressions of surprise and delight, and finding they had an hour to wait, they retired, as two minds with but one single thought, to the refreshment-room to celebrate the occasion. An hour later they emerged arm in arm, got into the train and away they went. Presently one said to the other—"Y'know, Bill, "s'wunnerful how the British railways have improved shinch we were boys. Here we are—hic—travellin' shixty miles n'hour in perfect comfort, you goin' to London—hic—an' I'm goin' to Glasgow, n'both in the same ruddy train. Could you do that thirty years ago—hic—No, Bill."

OVERSEAS RAILWAY AFFAIRS

(From our special correspondents)

SOUTH AFRICA

Train Service Accelerations

In 1932 the administration inaugurated its policy of running additional fast trains. The following particulars indicate the extent to which main line passenger trains have been speeded up since that time.

	Trains per week	Min. saved per train
Johannesburg–Capetown ...	3	79
,, ,, ...	1	464
Capetown–Johannesburg ...	3	145
,, ,, ...	1	503
,, ,, ...	1	515
Port Alfred–Johannesburg ...	3	60
Johannesburg–Port Elizabeth	4	25
,, ,,	1	175
Port Elizabeth–Johannesburg	1	395
Johannesburg–East London	1	410
East London–Johannesburg	1	312
,, ,,	6	135
Johannesburg–Durban ...	7	45
,, ,, ...	7	40
Durban–Johannesburg ...	7	42
,, ,, ...	7	37
Bulawayo–Johannesburg ...	2	45
,, ,, ...	1	130
DeAar–Walvis Bay	1	63
Walvis Bay–DeAar	2	111
Capetown–Port Elizabeth (via Mossel Bay)	1	640
Port Elizabeth–Capetown (via Mossel Bay)	1	543
Capetown–Port Elizabeth (via DeAar)	3	145
Capetown–East London (via Cookhouse)	2	224
East London–Capetown (via Cookhouse)	5	20
Capetown–East London (via Stormberg)...	3	97
East London–Capetown (via Stormberg)...	3	135
Capetown–Durban	1	142
Durban–Capetown	1	35
,, ,, ...	4	261
Capetown–Bulawayo ...	1	118
,, ,, ...	2	145
Bulawayo–Capetown ...	1	90
,, ,, ...	1	35
,, ,, ...	1	416
Port Elizabeth–Durban ...	1	142
Durban–Port Elizabeth ...	4	790
Bulawayo–Port Elizabeth ...	2	35
East London–Durban ...	1	187
,, ,, ...	4	90
Durban–East London ...	1	690
East London–Bulawayo ...	2	135
Bulawayo–East London ...	1	175
Durban–Bulawayo ...	3	35
Bulawayo–Durban	1	130
,, ,, ...	2	80

In view of the improved financial position, further speeding up of passenger and goods train services will be effected in the near future. These will include Capetown-Johannesburg express trains which will be accelerated by about thirty-five minutes each way; Durban-Johannesburg daily fast passenger by from forty-five to sixty minutes; Bulawayo-Durban once weekly, by about 340 minutes; Bulawayo-Capetown once weekly, by about 516 minutes; Port Elizabeth East London, by about sixty minutes each way, six days a week; Capetown-Bulawayo express, by about sixty minutes and Bulawayo-Capetown limited train by about thirty minutes. Mixed services generally have also been accelerated on the majority of sections as well as goods trains on all systems, both main and branch lines.

Financial Position

The accounts for the month of January show a surplus of revenue over expenditure of £402,960 bringing the surplus for the ten months, April, 1934, to January, 1935, up to £2,831,960. Deducting the accumulated deficit of £2,168,269 there remains a surplus of £663,691 after taking into account a contribution of £697,500 to betterment, pensions and superannuation funds. The Minister of Railways in his recent budget speech forecast a surplus for the year ending March 31 of £879,734. With two months still to go it is probable that this figure will be considerably exceeded. The earnings from transport services only for the ten months totalled £22,502,872, an increase of £2,654,149 compared with the corresponding period of the previous year. Railway working expenditure totalled £15,176,038, an increase of £1,175,091.

SPAIN

Asociacion de Transportes Por Via Ferrea

This association, of which practically all the Spanish railway companies are members, held a general meeting in Madrid on March 16. The general situation of the railways was discussed, and it was resolved to convey a note of the conclusions of the meeting to the Government. The Minister of Public Works was asked to give an audience, and later on the same day the executive of the association, accompanied by a representative group of railway directors and managers, under the leadership of Señores Escoriaza and Vives, were received by the Minister. The latter was sympathetic and promised to consider the various matters forming the conclusions; he pointed out, however, that the constant changes of Government, and corresponding lack of continuity, were the enemies responsible for the failure to give effect to many of the measures which he recognised as desirable and advisable.

Minas de Cala

This company, a mining enterprise with headquarters in Balbao, works 145 km. of narrow gauge railway in the Seville district, and has been working under serious difficulties for the past three years owing to the depression in the export business of iron ore which contributed its principal traffic. Now the courts have approved an arrangement under which the debenture holders, by a three-fifths majority, agree to a moratorium of their interest and sinking fund until 1941, during which period all the net earnings are to be paid to the debenture holders, while if at the end of the term the company is still unable to meet its charges, the property is to be offered to public auction and the proceeds of the sale credited, in the proportions of 90 per cent. to the debenture holders and 10 per cent. to the shareholders.

Madrid "Metro" in 1934

The Madrid underground railway company held its annual general meeting on March 16, when there was a good attendance, 38,220 shares being represented. The accounts for 1934 were approved, and the General Manager and Chief Engineer, Señor Otamendi, read a report on the working of the railway. He described the work on the new Sol-Embajadores line, which will probably be ready for the summer of 1936. The company contemplates soon introducing a service of trains each with 500 to 600 seats and running at two-minute intervals. The revolution of October occasioned a serious loss to the company, and it is reflected in the dividend. Gross receipts were 17,058,219 pesetas and net profit 4,669,356. The dividend is 3 per cent., plus a further 3 per cent. complementary dividend, plus 1 per cent. bonus, or, say, 7 per cent. in all, and 29,356 pesetas are carried forward.

ITALY

Proposed New Chord Line, Pavia-Brescia

For many years past the problem of rapid and direct communication between the ports of Genoa and Venice, without passing through Milan, has been considered, and now, owing to the development of the Venetian zone and the Brenner Pass route to Austria, it has become a matter of such urgency that, according to Reuters, a new line is to be built from Pavia to Brescia. The intention is to link up the two existing

Map showing proposed Pavia-Brescia direct line in Northern Italy

railway systems (*a*) west of Pavia and (*b*) east of Brescia with a new chord line running via Lodi, Crema and Soncino, and so relieve Milan not only of heavy through coast to coast traffic, but also important direct traffic between the Brescia and Pavia districts. The new line will serve a busy intermediate industrial area and shorten the journey from Pavia to Brescia by some 29 km. It is also stated that it will have long straight stretches, easy curves and gradients, and will be about 96 km. in length. The estimated cost is some 86,000,000 lire, or say £1,433,000.

U.S.S.R.

Reported Developments

Hitherto railway facilities have admittedly not kept pace with increasing trade in the Soviet Republics, and while minerals of all kinds increased by about 100 per cent., freight car capacity during the same period was stated to have increased only about 17 per cent. The result is that at the present time vast quantities of materials of all kinds are choking warehouses, awaiting transportation.

Rolling Stock Programme

Latest reports from Moscow indicate that the authorities have now decided to provide an additional 80,000 freight cars this year, or more than the aggregate number during the whole of the first five year plan. Other items in the programme of this year's construction are 1,500 steam, 30 diesel, and 50 electric locomotives. The shops at Lugansk are to turn out 470 powerful "FD" steam locomotives, a figure which is greater than that in 1934 by 173. Also 115 "SU" fast passenger locomotives are to be built at the Krasnoye Sormova works, and at the Kharkov shops 100 "SO" locomotives, which are to be 30 per cent. more powerful than the present freight engines, and very much more economical, are to be turned out. "JS" locomotives are to be produced at Kolomna, and also the 30 diesel locomotives. The inclusion in the programme of 470 "FD" engines should greatly increase the capacities of some of the more important routes such as Moscow-Kharkov-Krasni-Liman, where freights are mostly coal; Moscow-Rostov (grain and oil); Donbas-Krivoi Rog (mineral ore).

Other Equipment and Permanent Way

Meanwhile one of the largest items of expenditure is to be upon rolling stock equipment and repair facilities, including the installation of automatic brakes on all freight trains. The permanent way, too, will receive due attention, and over 40 per cent. of the total expenditure is to be allotted to its improvement and the construction of new and branch lines. In this connection it is stated that 5,860 km. of relaying are to be undertaken, and over 23 million new sleepers laid, while 1,500 km. of line are to be properly ballasted. Altogether, 4,000,000,000 roubles are scheduled to be spent on railway improvement generally, including over 41,000,000 roubles on new construction work, which will be principally in the mining areas of Western Siberia.

DENMARK

Little Belt Bridge

The steelwork of the Little Belt bridge is now complete, and the laying of the railway track and the roadway has begun. The opening of the bridge will take place on May 14, when a special train (one of the new fast diesel-electric trains to be put into service on May 15) with the King of Denmark, the Minister of Public Works, the General Manager of the Danish State Railways, and a number of other prominent guests on board, will arrive at the new station Broen (The Bridge) from Copenhagen. The actual opening ceremony will then take place at this station, which is situated immediately before the bridge on the Fyn side. After the ceremony the special train will continue across the bridge to Fredericia, where the large new station works will be inspected. While the inaugural train passes across the bridge, it is intended that the Danish Royal Yacht shall pass beneath it. The roadway across the bridge will be opened to the public immediately after the ceremony, and the regular train service across it will begin with the introduction of the new timetable on May 15.

FINLAND

State Railways in 1934

The following are the results of working the Finnish State Railways in the past year:—

	1933	1934
Passenger traffic		
Passengers carried	17,078,300	17,936,200
	Fmks.	Fmks.
Passenger revenue	195,672,500	215,607,600
Goods traffic	tons	tons
Tonnage carried ...	10,277,097	12,438,017
	Fmks.	Fmks.
Revenue	488,516,700	570,430,800
Revenue and expenditure	Fmks.	Fmks.
Total revenue ...	725,822,100	829,501,600
*Cost of operation	655,032,300	673,848,000
Surplus	70,789,800	155,653,600

* Not including sums spent on extensions, amounting in 1934 to Fmks. 135,384,200.

These results are considered satisfactory, and are probably as good as in any previous year. In 1932 operating expenses exceeded gross revenue by 5 million marks, and this unsatisfactory state of affairs gave rise to much criticism of the State Railways administration, and the opprobrium which was then meted out to it has probably been responsible to some extent for the drastic measures towards economy that have since been taken. In 1933, for instance, expenses were reduced by nearly Fmks. 30 million. The capital value of the State Railways at the end of 1933 was estimated at Fmks. 6,475 million, so that the surplus achieved in 1934 was no more than 2·4 per cent. of this sum.

NEW ZEALAND

The Popularity of Excursions

So popular have been some of the excursions recently advertised by the Railway Department that the advertising has had to be curtailed to keep the numbers of passengers within reasonable limits. For instance a 313-mile week-end excursion from Wellington to Waitomo was advertised for February 2. By the previous Wednesday, however, bookings had reached the 300 limit of road motor accommodation available at the Waitomo end, between Hangatiki station and the caves, a distance of seven miles. Advertising had consequently to be stopped, but, to satisfy those who did not book sufficiently early to be included in the first excursion, another one was arranged for a later date. The popularity of this excursion was largely due to its timings being so arranged that the complete trip could be made without loss of business time and without additional costs for hotel accommodation. The use of first class carriages and low combined rail and road motor fare also contributed to its success.

A somewhat similar excursion from Hamilton, in the centre of the Auckland dairying district, to Tauranga, a popular seaside resort 100 miles to the east, recently carried over 1,000 passengers in two trains. This number, however, proved quite beyond the capacity of the Tauranga launches running to the ocean beach. As the excursions are distinctly profitable, a waiting list is quite in order.

New Night Freight Expresses

The administration has, since February 18, been running a night goods service from Wellington to Napier (200 miles) and Napier to Wellington, as a means of meeting the competition of established road-transport services. A canvass for business has been made, and the service is attracting a good deal of patronage from business firms. The rate has been fixed at 55s. a ton, including door to door transport, as against the rate of £4 charged by the road transport companies. Arrangements have been made with the carriers in the centres concerned to guarantee the carriage of a certain quantity of goods, and they have undertaken collection and delivery of consignments. In this way it is hoped to regain the goods traffic between Wellington and Hawke's Bay stations which has, in recent years, been captured by road motor transport. Goods consigned in Wellington up to 6 p.m. arrive in Napier at 7.25 a.m. the next morning, and are delivered to consignees at 8 a.m. The night goods from Napier leaves at 5.40 p.m. and goods forwarded by it are delivered in Wellington the following morning. The Postal Department is also using the service to expedite mail deliveries.

RAILWAY MAINTENANCE PROBLEMS, IV—ABUTMENTS, WING WALLS, AND BEDSTONES

By Lt.-Col. H. A. HULL, M.Inst.C.E., District Engineer, Northampton, L.N.W.R., & L.M.S.R., 1918-33

Notwithstanding all the knowledge now available in print, some of the most essential and elementary facts are often ignored. There are always pioneers at work, on whose heels follow those with ingenious minds to record their results as formulæ for the future guidance of the unimaginative or timid

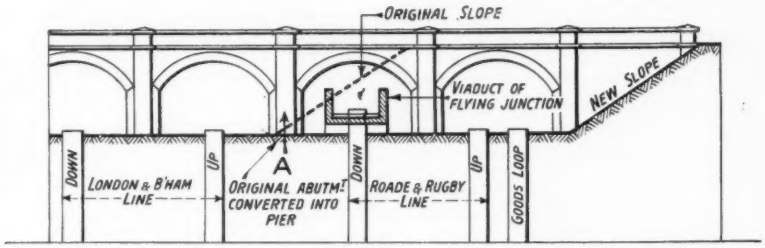


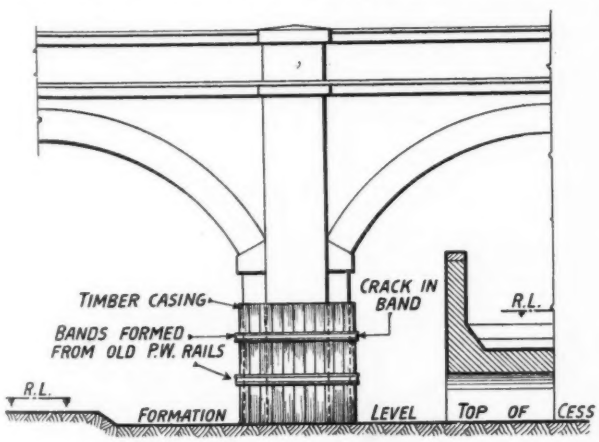
FIG. 1.

THIS article will deal only with that part of a structure above its foundations, the last article having dealt with the subject of foundations themselves. The line of demarcation between foundations and their superstructures has never been absolutely defined. The generic term foundation should mean the prepared formation upon which the structure is built, yet it is commonly used to include all the concrete work that may be required to fill up the excavation below ground or water level, as well as the footings.

Few structures are entirely free from defects, which nearly always develop after construction has been completed. Very many such defects are traceable to wedge action deriving movement from vibration.

To illustrate this point the case of Viaduct No. 274, carrying a now disused occupation road over the railway just south of Rugby, Trent Valley station, may be taken. As originally built the bridge had two openings of 34 ft. span over the London & Birmingham Railway, but when the Roade and Rugby line was made the bridge was widened to four openings and the original abutment A became a pier, see Fig. 1. In the course of time many cracks developed all round pier A, from ground to springing level, which merged into one or two main cracks in the adjacent spandrel walls and arch rings.

Heavy cast iron wall plates, held together by $1\frac{1}{4}$ in. steel tie rods which had been inserted in the pier, had cracked, an indication that something serious was happening within the pier. It was therefore encased in a sort of strait-waistcoat of timber uprights bound with steel rails, as shown in Fig. 2. This appeared successful in preventing



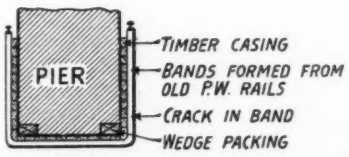


FIG. 2.

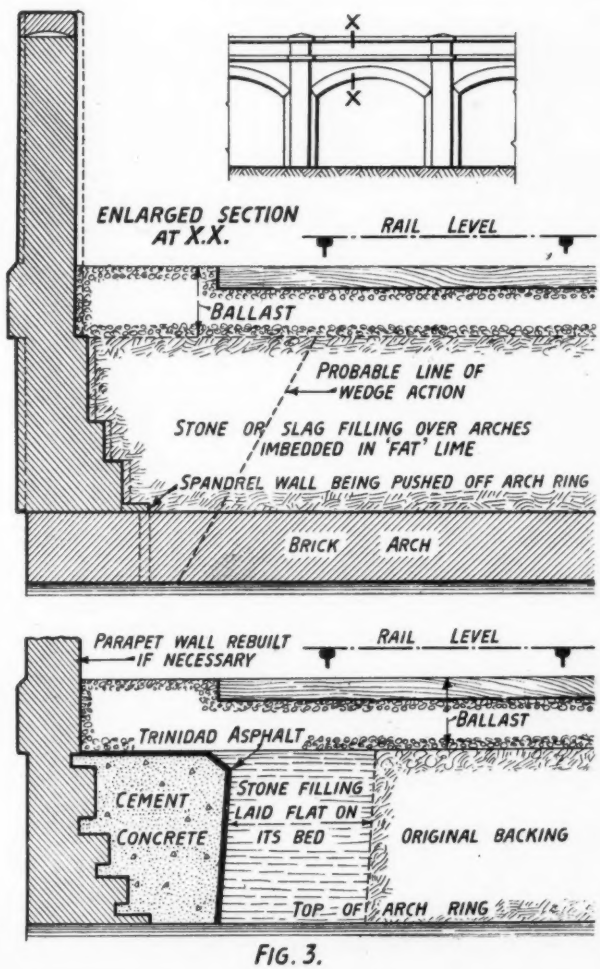


FIG. 3.

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fresh cracks until one day it was reported that the top binding rail had broken right through. The matter was now becoming serious and it was finally agreed that the probable cause of the trouble was failure to make a proper bond between the new face work and the remaining portion of the old abutment when it was converted into a pier, and that the metalling from the roadway above was making its way down within the core of the pier and acting under the vibration of passing traffic as a wedge. The pier was therefore grouted under pressure. The total weight of aggregate in the grout absorbed up to springing level amounted to 3½ tons. When the grout holes were being driven voids were discovered within the pier, confirming the diagnosis. The remedy adopted has proved finally effective.

A defect found in masonry arch bridges is the movement of parapet and spandrel walls off the arch ring, the cause being that the filling was of loose material. A typical case is shown in Fig. 3. On opening out the ballast it was found that the backing had been made with fat lime concrete which had never set, nor had there been any attempt to form a bond between this filling and the spandrel walls. The result was that the mass, being mobile, had, under the influence of wedge action set up by vibration, begun to thrust the spandrel and parapet walls off their bed on the arch ring.

To remedy this state of affairs the outer running rail was temporarily supported under the sleepers by a longitudinal timber; the ballast and defective filling were removed for a width sufficient to allow of the construction of a concrete side wall bonded on to the brickwork and the spandrel, which itself was taken down and rebuilt in its proper position. Fresh filling of flat stones was substituted for the old for a width of about 3 ft. It was so packed as to eliminate the possibility of future wedge action. This remedy was completely successful.

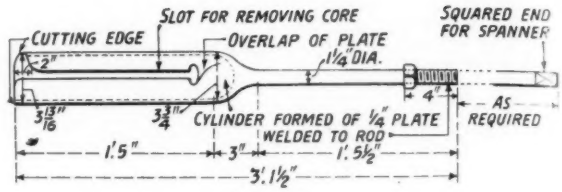

FIG. 4A.

Strengthening Retaining Walls

A common method of strengthening abutments, wing or retaining walls, when defects have begun to show, is to put a mass of concrete behind the original work without bonding it thereto. Between the back of the old structure and the new mass concrete filling small material of various sorts is apt to find its way, and the vibration of passing traffic enables it to fall downwards, acting as a wedge and actually weakening rather than strengthening the original wall. Fig. 4 illustrates an effective method of strengthening such a wall, the principle being to tie it back to a comparatively small concrete anchor placed in a convenient position clear of running lines. As many rods and anchors as may be required can, of course, be provided.

The hole through the masonry wall is drilled in the ordinary way by means of a jumper, but the bore through the earthwork calls for a special method. In the instance shown in Fig. 4 the suggestion was made to use a thrust borer so as to avoid the expense and interference with the running roads involved by digging a trench. Owing to the suspicion that there were boulders in the embankment, however, the idea of using a thrust borer had to be abandoned, since it cannot penetrate, but is deflected by boulders. The scoop shown in detail, Fig. 4A, was therefore designed by the writer and proved capable of boring the required hole without difficulty. Extension pieces were added as the head travelled towards its objective, and it had to be withdrawn at frequent intervals to extract the clay it had gathered. It was kept in alignment by means of a temporary timber gantry erected against the abutment, and was driven forward by pressure from a screw jack whilst it was kept slowly rotating by means of a spanner on the outside end. Stone boulders were actually encountered, but were easily broken through by using an ordinary rose-head jumper, similar to the one used for drilling through the brickwork of the abutment.

A temporary intercepting pit was sunk in the 6-foot way to check the alignment of the scoop. This pit was also used to join the two lengths of the tie rod by means of a muff coupling. On completion of the hole, the tie rod was fixed in position with its far end in the space excavated for the anchor, which was then filled in with cement concrete. Grout was then forced in under pressure from the abutment end to fill up the bore hole. It was impossible to ensure that the rod had been surrounded by the cement grout for the whole of its length, but its diameter was large enough to ensure an indefinite life without this protection.

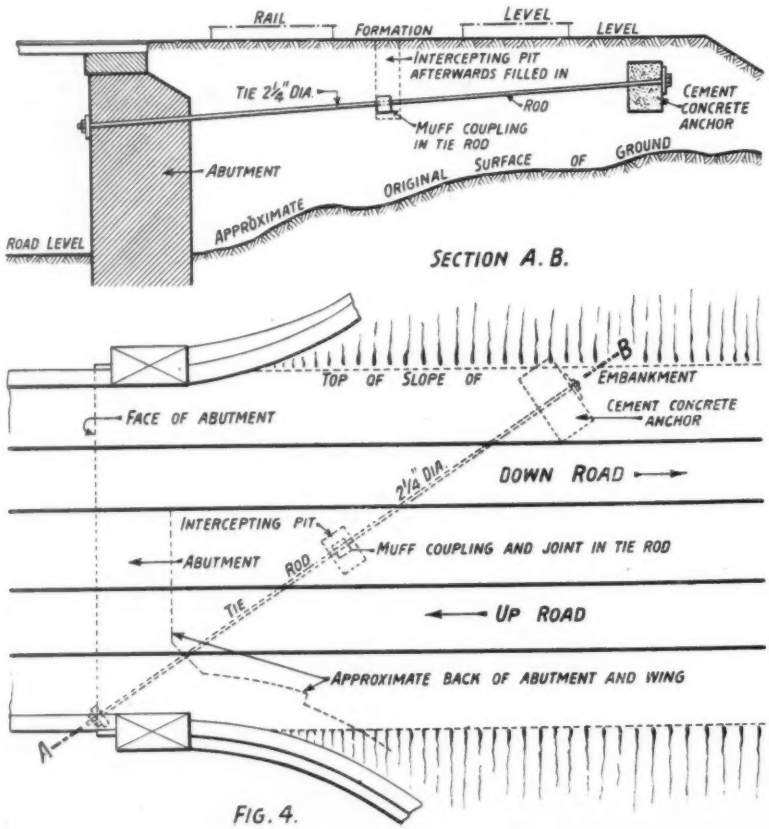

FIG. 4.

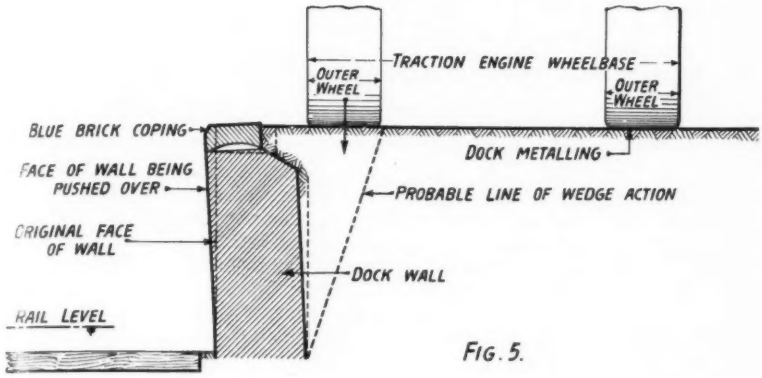

FIG. 5.

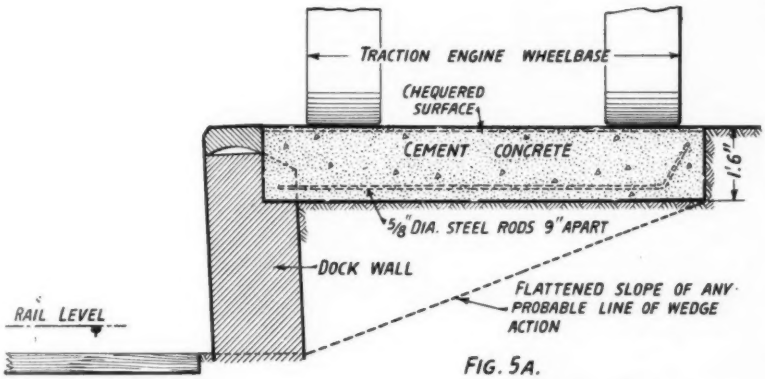

FIG. 5A.

The cost of carrying out the work was comparatively small, and as the method gives great strength and eliminates all chances of damage by wedge action, the writer adopted it for all similar works with unvarying success.

With the advent of heavy lorries, traction engines and similar loads, many dock walls constructed for the comparatively light horse traffic of the past have proved unequal to the strain, and, as shown in Fig. 5, have gradually been pushed over. An effective remedy, not necessitating the rebuilding of the wall unless it was seriously out of plumb, is indicated in Fig. 5A. A benching is made at the top of the back of the wall to take a reinforced concrete platform of sufficient width to distribute the load on an area wide enough to prevent wedge action in the filling underneath. The cost of the work is little more than that of pulling down the original wall, rebuilding it of greater thickness and providing a more substantial metalled roadway to carry modern traffic.

Buffer Stops

Although buffer stops may be classified under the heading of permanent way and its ancillary works, which will be the subject of a succeeding article, they may also come under the general heading of the present article when they consist of walls containing a core of earth, such as are used at the ends of goods sidings. This type of buffer stop causes much trouble in maintenance, chiefly owing to the decay of the outside timber casing. In positions where there was no likelihood of any alteration to the permanent way layout, the design shown in Fig. 6 was adopted, and modified to suit local conditions. To prevent the initial shocks, caused by blows from the traffic coming into direct contact with the concrete, a timber cushion in the form of an ordinary buffer beam supported on timber uprights, neither being directly attached to the concrete block, was used. Elm was found to be economical and satisfactory as a substitute for the more usual oak for this purpose.

The design of the side walls calls for special mention. It will be noticed that the backs of these walls, retaining the earth or clay core, are tapered from the bottom outwards to the top. This effects an economy over a solid concrete block, and the tapering of the walls eliminates the possibility of damage to them due to wedge action of the retained core under the vibration of shunting shocks.

The reinforcement, too, was specially designed. The writer had observed that the force of impact in a head-on collision has little effect upon the formation of ballast and earth carrying the permanent way, but that the resultant action is always upwards, often buffer stops of the solid type giving evidence of having been lifted bodily in such a collision. He also

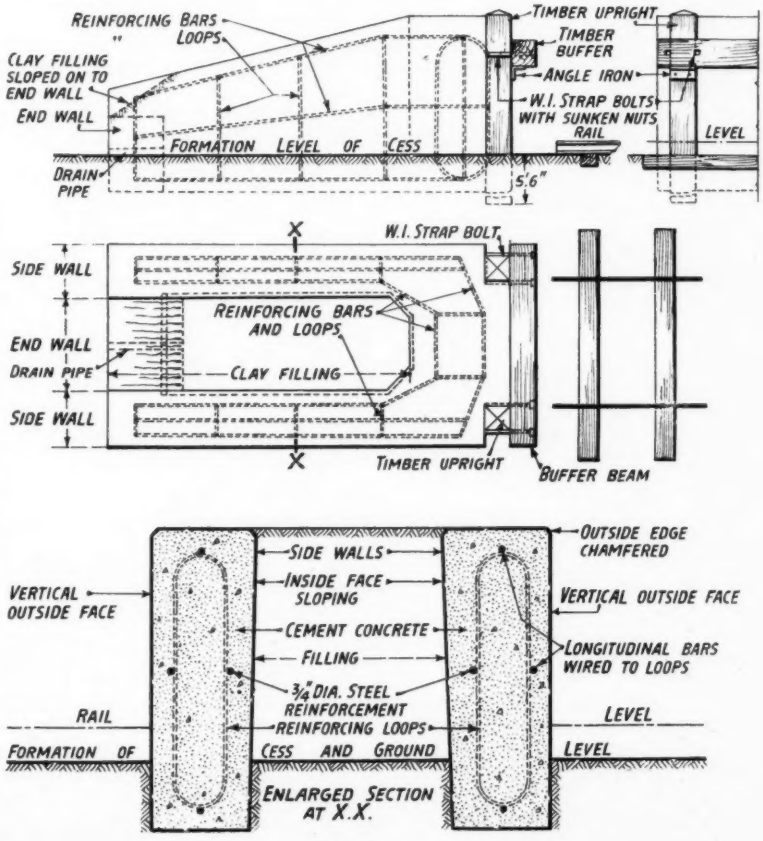

FIG. 6.

noticed that it is much more difficult to draw a loop of rope through grass, or even water, than to draw an unlooped rope. His design of the interior reinforcement, therefore, was based upon these observations. The correctness of the design is attested by the fact that this type of buffer stop has required no maintenance since its introduction on the district. The design is economical and the materials required were mostly obtained locally.

Retaining Walls

In Fig. 7 is shown the design of a typical retaining wall with an external batter of 1 in 12 and the internal face

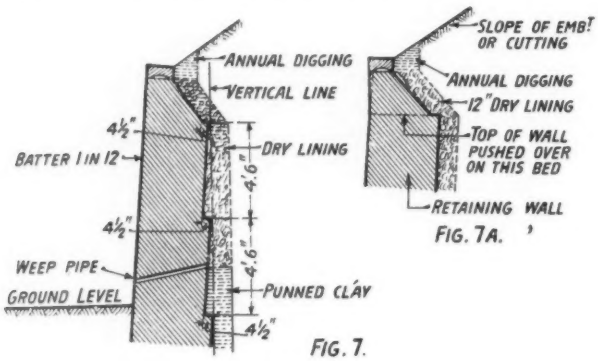

FIG. 7A.

FIG. 7.

stepped back every 4 ft. 6 in. in vertical height by the 4½ in. width of a brick, resulting in what is practically a vertical back. It is usual with this design to insert punned clay, or the nearest approach to it that can be obtained locally, behind the wall up to the level of the weep pipes. Above this a filling of dry rubble is built, the object being, of course, effective drainage behind the wall.

The only thing to be said against the provision of the bottom section of punned earth or clay is that unless it is composed of actual clay it may allow the percolation of moisture downward without directing it into the weep pipes. The latter in actual practice are generally found to be useless. Should there be any definite signs of water behind the wall it should be canalised before completion of the structure. If, on the other hand, there is no such sign of water during construction it seems scarcely necessary to provide the elaborate filling of clay and rubble behind the wall. As a matter of fact the rubble is seldom put in with sufficient care to ensure the freedom of its interstices, so that in any case it is an inefficient means of drainage. Further, it is very liable to act as a wedge under vibration of passing traffic, and by degrees to push the wall over.

The practice of digging over the turf annually at the top of a wing or retaining wall behind the coping was discussed in the previous article on foundations and need not be further considered, except to point out that such a practice allows water to get into the rubble so that, in times of hard frost, the topmost courses of the brick work may be pushed off their bed as shown in Fig. 7A. This is a common occurrence involving a considerable expenditure annually.

In Fig. 8 it is shown that to design the blue brick coping of a wing wall so as to abut directly against the stone cap of a newel may force the latter out of position due to expansion of the coping in hot weather. A further effect is to allow moisture and then frost to damage the brickwork of the newel. Fig. 8A shows the correct construction, and Fig. 8B what may happen to a coping of blue brick carried in a continuous wave, as shown in Fig. 8C, rather than in steps as in Fig. 8D.

Bedstones

A continual cause of expense in maintenance is cracked bedstones. The writer's experience, however, has shown that, unless the cleavage is vertical and near the outer edge of the stone, and there is a likelihood of its actually coming away and leaving the girder unsupported, there is no need to renew the stone. As a rule, vertical cracks mean simply that the bedding of the stone was, in the first instance, hollow, or has since become so, and that the stone itself has not been strong enough to act as a beam. When a stone is found to be cracked near its centre, and it can be grouted up so as to prevent movement, there is no need to renew it, particularly as it is often a matter of difficulty to get a true setting for the new stone, and it in turn may crack from the same cause. The soundness of this argument is evidenced by the fact that when very large bearings are required, it is usual to divide the bedstone into commercial sizes and distribute the bearing of the girder over the severed portions. Further, to support the argument, there is the case of a bedstone in a viaduct carrying a railway over a street in the heart of London. Queen Victoria had arranged to open this bridge with imposing ceremony when, on the night before, it was discovered that this particular bedstone had developed a crack down its centre. As there was no time to renew it, and it was out of the question to postpone the ceremony, nothing was done. To the best

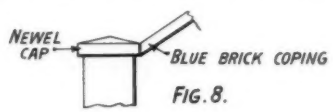

FIG. 8.

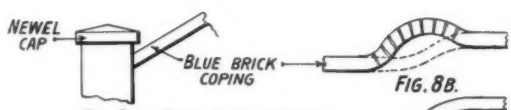

FIG. 8A.

FIG. 8B.

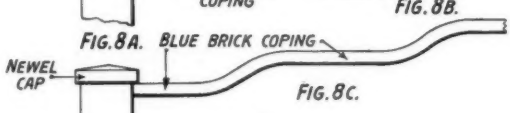

FIG. 8C.

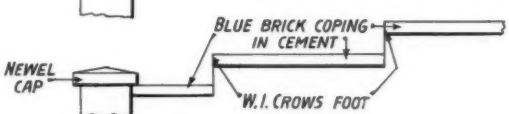

FIG. 8D.

of his knowledge, the writer believes that the same cracked bedstone is there to this day.

Two or more courses of blue brickwork set in cement, the depth being decided by local circumstances, is the most efficient type of girder bearing that can be desired.

We hope to publish the next article in this series in our issue dated May 10. Previous articles appeared in our January 18, February 15, and March 15 issues.

SUCCESS OF HIGH SPEED TRAIN IN U.S.A.—From the *Railway Age* we learn that during the first month of operation, the three-car, articulated streamlined train of the Union Pacific Railroad was filled to capacity on practically every run, while at times it carried twice as many people as there were seats. During February, 6,505 persons travelled in the train. On one trip, a total of 254 persons patronised the train, while on February 24, the train entered Kansas City with 233 persons on board. On the eastbound trips during February, an average of 109 persons travelled, while westbound the average was 123.

THE HORSE-POWER OF LOCOMOTIVES—ITS CALCULATION AND MEASUREMENT

By E. L. DIAMOND, B.Sc. (Eng.), A.M.Inst.C.E., A.M.I.Mech.E.

This is the first of a series of articles giving a critical account of the work that has been done in various parts of the world on a subject that today has acquired a new importance in view of the competition between the steam locomotive and other methods of railway traction. We refer to the subject in an editorial article on page 681.

INTRODUCTION

Purpose of Articles.—The measurement of the indicated or drawbar horse-power of a locomotive at any particular point during a journey is naturally a fairly simple matter if the engine is fitted with the necessary indicating gear or a dynamometer car is attached behind the locomotive tender. What is infinitely more difficult is to establish a rationale by which the results so obtained may be related to the dimensions and design of the locomotive and the nature of the resistances it is overcoming.

The advantages of such a rationale are twofold. First, it facilitates the comparison of existing locomotives and the design of new locomotives; secondly, it permits of the exact calculation of train schedules so as to use the locomotives to the best advantage. No satisfactory rationale of this kind has yet been evolved, hence the inconclusiveness of many problems of locomotive design, and the inconsistencies of steam-train schedules.

The purely theoretical approach to the problem has never been pursued very far. The German engineers Frank and Strahl made tentative attempts in this direction; Frank's attempt was pure guesswork, while Strahl's formula for mean effective pressure is so involved, despite its wholesale assumptions, as to discourage further work in this direction.

Two other methods of approach, which may be called respectively the empirical and the experimental, have been tried from almost the earliest days of locomotives. By the empirical is meant the establishment of a formula, graph, or table of figures on the basis of available test data, which shall then be universally applicable to all locomotives, without further testing. By the experimental is meant the establishment of a criterion to which the individual testing of each locomotive type may be carried out, and by which the results so obtained may be truly compared. The empirical method, first developed in Germany, has in recent years become American practice. The experimental method, first systematically developed in France and Russia, is still essentially the Continental method.

Daniel Clark, an Englishman, was the pioneer in the systematic study of locomotive performance; his work stood in his own day far in advance of that of any of his contemporaries, and can still be read with profit. Since then, apart from miscellaneous testing and one or two critical examinations of American test-plant data by Professor Dalby and others, English railway engineers have shown no great interest in the subject; not only has no important contribution been made to it in this country, but no adequate account of the work that has been done abroad has been published here. It is hoped that the present articles will remedy the latter deficiency, and that by the critical presentation on a comparative basis of the various methods of calculation and testing evolved, the whole subject may be placed in a clearer light than hitherto. So many variable factors are involved in locomotive performance that it is not surprising that much confusion exists.*

This subject is of greater importance today on account of the current developments of railway traction in the direction of greater speed (which means that locomotives must be operated at nearer their maximum power), and in connection with the introduction of alternative forms of locomotion, for which the power can be calculated with comparative ease and exactitude.

Closely allied with the question of the power of the locomotive itself is the subject of train resistance, without which the calculation of speed-time curves and train schedules is impossible. This aspect of the subject, however, is not considered in these articles, which are concerned solely with the locomotive itself. It has been more thoroughly treated in technical literature, and at the present time is the subject of extensive research, especially in connection with the reduction of air resistance by streamlining.

Nature of the Problem.—It is a comparatively easy matter to calculate with a fair degree of accuracy the horse-power which a reciprocating steam engine will give at a speed sufficiently low to avoid considerable throttling of the steam and at a fixed exhaust pressure. When such an engine, as in the case of a locomotive, attains speeds exceeding 300 r.p.m., at which considerable attenuation of the indicator diagram takes place due to the restricted passages through which the steam must pass into and out of the cylinder, it becomes much more difficult, since not only are the steam passages of complex form, but the action of the valve still further complicates the throttling effect. If all cylinders and valve gears were of standard design it would be possible to evolve empirical formulæ or factors by which to calculate the horse-power under any given conditions.

But actually cylinders and valve gears differ very greatly. Moreover the locomotive does not exhaust its steam to a condenser at a constant vacuum, but to the atmosphere through the restricted orifice of the blast pipe. Since the function of the blast pipe is connected with the boiler and not with the engine, and since its effect is dependent among other things on the action of the valve gear during exhaust, the back pressure in the locomotive cylinder will vary considerably, not only as between different locomotives, but also at different speeds and different cut-offs in one and the same engine.

Finally, since the locomotive must carry its own boiler, it has necessarily a restricted supply of steam, and this may be the deciding factor as to the maximum horse-power which the locomotive is capable of exerting at high speeds. The evaporative capacity of the boiler will depend not only on its dimensions and design, but also on the quality of the fuel supplied.

The electrical engineer is able to calculate exactly the horse-power which the motors of an electric train will exert throughout their range of speed, and he is accustomed, as a consequence, to fixing the schedules of such a train with absolute precision. From the considerations just outlined it is not difficult to understand the much

* For a typical example of the prevalent confusion see the discussion on T. A. F. Stone's paper on "Electric Locomotives" before the Institution of Mechanical Engineers, Proc.I.Mech.E., 1926, p. 1001.

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more complex character of the problem which the steam locomotive engineer has to face.

EARLY FORMULÆ AND INVESTIGATIONS

Work of D. K. Clark (1852).—D. K. Clark appears to have been the first to have recognised the influence of speed on locomotive power, though he confined himself to a quantitative estimate of the mean effective pressure in terms of the cut-off. In his remarkable paper on "Expansive Working of Steam in Locomotives"* he gave the following approximate rule:—

$m.e.p. = (13{\cdot}5\sqrt{A} - 28)$ per cent. of the boiler pressure where A is the percentage cut-off. It was intended to apply for boiler pressures from 60 to 100 or even 150 lb. per sq. in. He pointed out that this rule gave results rather too small for lower speeds and rather too great for higher speeds, thus showing his recognition of the phenomenon of indicator diagram attenuation at speed. He estimated that for speeds amounting to 55 or 60 m.p.h. the loss by imperfect exhaust caused a large increase of steam consumption per horse-power per hour, amounting to 12 to 33 per cent., according to the amount of admission.

Clark also estimated the steam consumption per indicated horse-power hour as

$$0{\cdot}22A + 14 \text{ lb.}\dagger$$

Hence, allowing for an evaporation of 9 lb. of water per pound of coke, the rate of fuel consumption for a given tractive effort at a given speed could be ascertained. Since he gave also values of 100 lb. of coke per square foot of grate per hour and 80 sq. ft. of heating surface per square foot of grate, he established a complete empirical relationship between power and size of boiler.

Early German Ratios.—Professor Nordmann of the German State Railway has several times published historical summaries of the work of German engineers on this subject. The earliest of the German attempts to evaluate locomotive power referred to by Professor Nordmann‡ is that of the theoretician Redtenbacher, who about the same time that Clark in this country was publishing the results of his experience, proposed in his "Gesetzen des Lokomotiv-Baues" (1855) an expression based on the weight, in working order, of the locomotive. Such a relationship is, of course, crude in the extreme and helps to show how far in advance Clark's work was. In 1875 other German engineers published certain average ratios between the power and heating surface for various generic types of locomotives. These writers recognised that such ratios varied considerably between individual locomotive designs, but the variability of the ratio for one and the same locomotive at different speeds remained uninvestigated.

Frank's Formula (1887).—Professor Frank in 1887 expressed this same ratio as a function of the speed V in the formula

$$N/H = \alpha + \beta\sqrt{V}$$

where N is the horse-power, H the heating surface, and α and β are constants. This gives a power curve which increases with speed at a decreasing rate. The lower part of the curve lies above the limit imposed by adhesion, and is replaced by a straight line representing the product of the speed, the weight on the driving wheels, and the adhesion factor (Fig. 1). The constants α and β had different values for passenger and goods locomotives.

* Proc.I.Mech.E., 1852, pp. 60, 109.

† "Railway Machinery," p. 116.

‡ *Glasers Annalen*, 1911, vol. 69, p. 237.

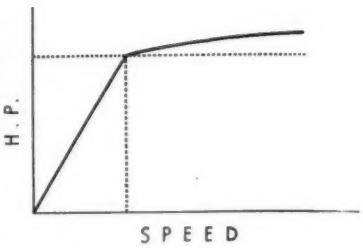


Fig. 1—Horse-power curve (Frank)

The ratios and constants given by these early German workers were, of course, based on road test observations, Professor Frank, for instance, calculating his constants from the results of numerous observations on the then prevalent classes of passenger and goods locomotives of the former Prussian State Railways. But for a better understanding of the conditions governing power output especially at high speeds, a closer independent study of the nature of the steam action in the cylinders and of the evaporative performance of the boiler was essential.

Early Work with the Indicator Diagram.—The use of the indicator for locomotive testing gradually extended during the following thirty years. In 1877-79, for instance, John E. Martin published a series of reports to a committee of the American Railway Master Mechanics Association in which the steam action in the cylinders was closely studied, particularly from the point of view of the practical effect of alterations to the valve gear and blast pipe. In many respects these experiments were remarkably advanced for their day, but whilst the general influence of speed on the results obtained, particularly those relating to back pressure, was frequently noted, Martin was more interested in obtaining positive results from his alterations than in reducing to scientific order the fundamental variables underlying steam action.

This failure to appreciate the immense importance of establishing locomotive phenomena quantitatively on a speed basis not only prevented for nearly half a century a closer understanding of the conditions governing the power output of a locomotive, but also is the underlying reason for the inability of locomotive engineers to settle for so long, despite endless tests, such questions as the value of steam jacketing and compounding.

The Work of Desdouits with the Dynamic Pendulum.—The greater importance therefore attaches to the work of Desdouits who in 1890 published* a series of curves showing the variation with speed of tractive force at the rims of the driving wheels for different cut-offs. For this purpose he did not use indicator diagrams but a form of accelerometer or dynamic pendulum, to which extended reference will be made later† in connection with the Belgian method of testing. The tractive force measured by Desdouits is less than the indicated tractive force by an amount equal to the internal resistance of the mechanism of the locomotive. Some of Desdouits' curves have been modified to show horse-power instead of tractive force so as to make them comparable with the other curves of power illustrating this survey and are given in this form in Fig. 2. The particular locomotive type tested is of course long since obsolescent. It will be observed that these curves show a maximum, beyond which the power falls off very rapidly. Desdouits attributed this falling off to the aggravation of the effect of compression at short cut-offs and to the increase of back pressure at long cut-offs, a cut-off of 20 per cent. giving the most favourable balance between the two opposing causes of the loss of work. Desdouits' observations are of particular

* *Revue Générale des chemins de fer*, 1890, vol. 13, part 1, p. 271.

† See later articles.

interest as it has so often been assumed that the boiler is the only limiting factor to the power which a locomotive can develop. Desdouits may have found that the boilers of some of the early locomotive types he tested were able to supply as much steam as the engines were capable of using under any conditions of cut-off and speed. In this country to-day there are many old types of locomotives with valve gears of the short travel type, which will, with good coal and the boiler in a clean condition, run in full gear with full regulator opening at any speed attainable, without draining the boiler. Such a state of affairs, of course, is not necessarily a meritorious one.

Desdouits made no attempt to propound a general law for the predetermination of the power-speed curve. His idea was that such a curve should be determined for each new locomotive type either by means of a series of indicator diagrams or by use of the dynamic pendulum, and in this also he was a precursor of the modern Continental attitude. The importance of his work in connection with

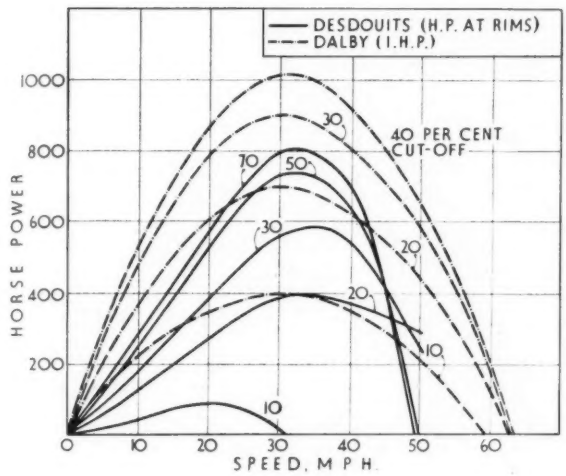


Fig. 2—Horse-power curves (Desdouits and Dalby)

scientific methods of locomotive testing is such that further reference must be made to it when dealing with the development of experimental technique, but it should be mentioned here that at the same time that he was studying the effect of speed on the horse-power of a locomotive he was also measuring the rolling resistance of locomotives at various speeds. He used the inertia method proposed by Frank in 1886 for the measurement of train resistance, both with the coupling and connecting rods removed so as to determine the resistance of the locomotive purely as a vehicle, and with the machinery in motion so as to determine the total resistance. The results of his experiments were published in the same article to which reference has already been made, so that, taken in conjunction with the curves of horse-power, his data afforded means for a complete study of the effect of speed on the horse-power at the rims of the driving wheels, and at the drawbar. But, as in the case of horse-power, so also for resistances he preferred the purely experimental method and gave no universally applicable formulæ such as were later evolved.

Goss's Formulæ.— In September of the year after Desdouits published his paper, the first locomotive to be tested by Professor W. F. M. Goss arrived at Purdue University. Ten years previously Alexandre Borodin had established the first stationary locomotive testing plant at Kieff in Russia, but it was of a temporary character, and suffered the serious limitation that it was not possible to absorb more than about 90 h.p.* Goss's plant was at first also limited to low power outputs, but with increasing experience the difficulties were overcome. A disastrous fire in 1894 completely destroyed the engineering laboratory at Purdue, but afforded an opportunity for the incorporation of this experience in a new plant, and the scientific study of the performance of the locomotive *Schenectady No. 1* and its successor, *Schenectady No. 2*, continued without interruption during the following years. The significance of this work is that, for the first time, the performance of a locomotive was studied exhaustively for the purpose of acquiring scientific knowledge of its performance in all its aspects. The phenomenon of indicator diagram attenuation at speed, the evaporative performance of the boiler, and the losses in friction, were all brought to light in their quantitative relation to each other and to the performance of the engine as a whole.

In 1901 Professor Goss published a paper† dealing with the power of locomotives, in which, as a result of the tests at Purdue University, he gave the formula

$$\text{i.h.p.} = 0{\cdot}43 \times \text{heating surface (sq. ft.)}$$

which was intended to apply only to simple engines using saturated steam. He arrived at this result by concluding that any locomotive should be able to evaporate 12 lb. of water per sq. ft. of heating surface, and that when working at full power, under the varying conditions of speed and cut-off at which that power may be developed, it requires approximately 27 lb. of steam per indicated horse-power per hour. Thus, the formula was not intended merely to represent a maximum attainable at the most favourable speed, but was regarded as a constant value, which, at the appropriate cut-off, could be obtained over a wide range of speed.

From the Purdue tests Professor Goss also estimated the internal machine resistance of a locomotive to be equivalent to a constant mean effective pressure of 3·8 lb. at all speeds. The rolling resistance of engine and tender he assumed to be not much different from that of an equal weight of train following the tender, and to be given approximately by

$$W = 2 + \frac{1}{6}V$$

where W is the rolling resistance per ton weight and V is the speed in miles per hour. The head air resistance of the locomotive, based on wind tunnel experiments made some years previously, he gave by the following formula:—

$$W' = 0{\cdot}11V^2$$

In Fig. 3 a curve of horse-power at the rim of the driving wheels based on Goss's formulæ is shown in comparison with curves derived from the early formulæ. It will be observed that it contradicts in essential respects the conclusions of Frank. How such apparently irreconcilable formulæ could be put forward will become evident later, when the complicated conditions governing the problem are made clearer. For the present, however, it should be stated that Frank was not entirely in the wrong. Goss's assumptions of a constant rate of evaporation and a constant specific steam consumption both tend to give excessive values for power output in the lower range of speed above the adhesion limit, especially as he assumed that a tractive effort of up to one-fourth of the adhesion weight could be obtained. In the following year, E. C.

* Proc.I.Mech.E., 1886, p. 298.

† Int. Railway Congress, 1902, p. 482.

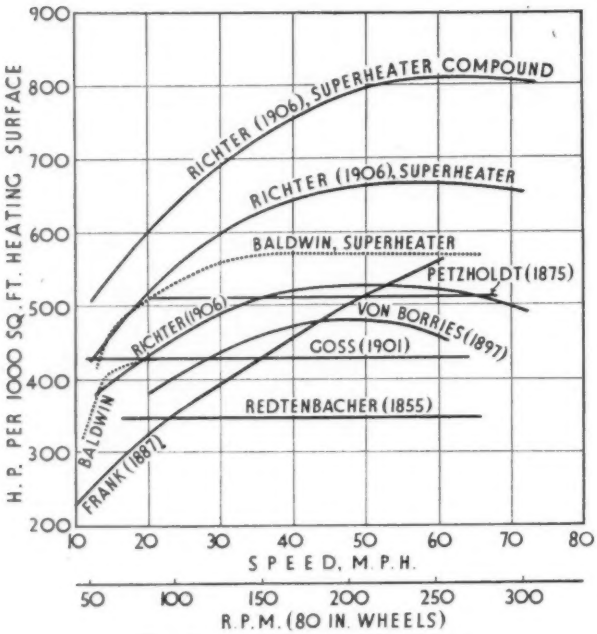


Fig. 3—Early horse-power curves

Schmidt published data* showing that Goss's formula gave values for drawbar pull which were from 20 to 50 per cent. higher than those obtained from dynamometer tests in road service at speeds below 30 m.p.h.

Tables of von Borries.—Meanwhile, in 1897, von Borries first published his tables and curves of horse-power for specific locomotives. These were based on road performances for which the horse-power was calculated by D. K. Clark's train resistance formula. Like Frank's formula, von Borries's figures gave the ratio of drawbar horse-power to the heating surface, and like his formula also, as first published they gave values which increased continually with the speed. Von Borries, however, realised that Clark's train resistance formula gave values which were too high at the higher speeds, and that actually the horse-power curve reached a maximum, after which it declined at high speeds. He may therefore be regarded as the first to perceive the true relationship between the horse-power and speed of the locomotive. It is also interesting to note that in his original tables he found it necessary to give a special column of figures for goods locomotives with a relatively small grate area, thus, as Nordmann pointed out,* showing his recognition of the fact that the grate is the primary source of energy. Von Borries's figures were revised from time to time and accepted for many years in Germany as standard; the curve in Fig. 3 is plotted from the figures given in the 1912 edition of his book " Das Eisenbahnmaschinenwesen der Gegenwart " as quoted by Lipetz.†

Besides recognising the somewhat arbitrary nature of the heating surface basis for horse-power ratios, as already mentioned, von Borries also drew attention to the importance of the relationship between the heating surface and the size of cylinder and postulated that the latter should be such that the steam was expanded most economically at the speed at which the heating surface generated the greatest possible quantity of steam. How this speed was to be determined was, however, another matter. Moreover, von Borries was by no means explicit regarding the effect of the machine friction of the engine, though his figures were generally regarded as applying to the power at the rim of the driving wheels. It should be remembered that whilst both Frank's and von Borries' values depended on an out-of-date formula for train resistance, and to that extent were inaccurate, they could give results sufficiently accurate for the approximate calculation of running times provided the train resistance was also estimated in this case by the same formula.

* Int. Railway Congress, 1902, p. 652.

* *Glasers Annalen*, 1911, vol. 69, p. 240.

† Trans. A.S.M.E., 1933, vol. 55, RR–55–2.

RHODESIA AND MASHONALAND RAILWAYS

THE following are some of the points dealt with in the Annual Report of the Railway Commission upon the Rhodesia and Mashonaland Railways for the year ended September 30, 1934, submitted to the Governments of Southern and Northern Rhodesia and the Bechuanaland Protectorate. The accounts for the previous year and estimates for the year under review are dealt with in a general way only, and with few details of accountancy, but a point which is brought out is the effect of reductions in salary and wage cuts, which resulted in an aggregate excess over estimate of £46,300 in 1933-34. Two pages of the report are devoted to appeals against and consequent modifications in rates and charges, dealt with by the commission. From the notes upon maintenance of engines and rolling stock, it appears that an increase of £12,491 in maintenance costs on the Rhodesia Railways is accounted for by an addition of nine locomotives to the stock, while on the Mashonaland Railway expenditure under this head was reduced by £47,294 owing to a decrease of 13 locomotives.

A satisfactorily steady improvement in the operating ratio has been maintained and in spite of coal consumption per engine-mile having fallen, the average train load and gross ton miles per train engine hour have both improved substantially. On the other hand, due to a reduction in the volume of heavy metal and mineral traffic handled, the average wagon load has not improved. On the four branch lines constructed under guarantees from various mining concerns there were shortfalls in working of from nine to twenty-one thousand pounds in 1932-33, and the estimated figures of loss for the year ended September 30, 1934, were much the same, except that the guarantee on the Ndola-Luanshya branch expired at the beginning of that year. The Deka-Victoria Falls deviation was expected to show a saving of £30,000 during 1933-34. The report concludes with 27 pages of annexures dealing with objections or applications made to the commission.

U.S.A. Railways Capital Expenditure in 1934.—According to the Association of American Railroads, gross capital expenditures in 1934 amounted to $212,712,000, the highest since 1931 when they amounted to $361,912,000. For equipment in 1934 $92,005,000 was spent, compared with $15,454,000 in 1933; $36,371,000 in 1932; $73,105,000 in 1931; and $328,269,000 in 1930. For way and works in 1934, gross capital expenditures totalled $120,707,000, compared with $88,493,000 in 1933 and $130,823,000 in 1932.

RAILWAYS AND ROAD TRANSPORT SECTION

This section appears at four-weekly intervals

Pooling of Coach Services

POOLING is very much in the air just now in connection with many phases of transport operation. At a recent meeting of the Omnibus Society Mr. W. Noel Jackson, M.A., traced the development of the idea in connection with long-distance coach operation from 1920, when the London & Coastal Motor Services pool was organised, to the formation last year of the Associated Motorways scheme, with services radiating in many directions from Cheltenham. Five different types of pools were mentioned, including the Limited Stop Pool, in the Liverpool-Newcastle area, plying all the way, and the Yorkshire-London Pool, between a "collection" area in Yorkshire and the Metropolis. The partners in the various pools are operators working between two towns by the same or slightly varying routes or providing several services between two areas. After the operating concerns have been allowed working expenses—9d. per mile is a usual figure—and administrative, advertising, and similar charges have been deducted, the receipts are pooled among the members on an agreed ratio. One company usually acts as a clearing house for the pool, either by dealing with each ticket issued, on the lines of the Railway Clearing House or with the summaries submitted by the operating companies. Incidentally, the scheme facilitates the purchase of independent concerns, the transaction being nominally carried out by one company which afterwards distributes the agreed holdings.

It is claimed that the public benefits by the pooling of services, as it provides alternative return routes, returning by a different company's bus running at a more convenient time, through booking, and the use of interchange stations like that at Victoria or those at Cheltenham, Portsmouth, and Barnsley. Mr. Noel Jackson drew attention to the interest of the railway companies in these pools, and said that although no published figures revealed the proportion of capital invested in limited stop working, the proportions of the issued capital of the parent companies were known, and, by assuming these companies to be partners to an approximately equal extent, the railway interest could be calculated. He gave the following statement of the railway interest in the pools mentioned:—

		Per cent.
Limited Stop Pool	.. L.M.S.R. & L.N.E.R. ..	.. 39
Yorkshire Services	.. L.M.S.R. & L.N.E.R. ..	.. 49
Blackpool-Yorkshire	.. L.M.S.R. & L.N.E.R. ..	.. 48
Blackpool-London	.. G.W.R., L.M.S.R. & L.N.E.R.	.. 43
Associated Motorways	G.W.R., L.M.S.R. & S.R. ..	.. 35

It was explained that the relative smallness of the interest in Associated Motorways was due to the presence of an independent company—Red & White Services Limited; and a 100 per cent. Tilling company—United Counties Omnibus Co. Ltd. It may also be pointed out that as from the beginning of this year the Southern National and Western National Companies have been partners, as proprietors of the Royal Blue Services (purchased from Elliott Brothers) in the Associated Motorways Pool.

Some of the pools have experienced a little difficulty in securing licences, but the schemes as a whole have proved so successful that Mr. Noel Jackson says that we can be certain that joint interest in services will remain, even though it may be found desirable to form separate limited liability companies to overcome the licensing difficulties.

The removal of the Windlesham House School from Brighton to a new site on Worthing Downs was rendered a comparatively simple matter by the use of Southern Railway containers. In our illustration containers are seen being unloaded at the new school building

The Influence of the Road-Rail Traffic Act on Goods Transport by Road

IN a paper presented to the Institute of Transport on Monday last, Mr. J. S. Nicholl, Member of Council, after reviewing the objects of the Road and Rail Traffic Act, 1933, and the structure of the measure, went on to examine how far it was likely to achieve its declared objects and what further developments might be necessary to bring its final objectives within the range of possibility.

As regarded the insurance of public safety and the safeguarding of public amenities, Mr. Nicholl stated that it must be granted that the provisions in regard to the fitness of vehicles, their maintenance in roadworthy condition, the observance of speed and load limits and of reasonable driving hours, backed by the elaborate record system and the general penalties under the Act and, overshadowing all, the possibility of suspension or revocation of licence, ought to succeed in eliminating improper operating methods where such existed. In every flock there were a few black sheep, and there was little doubt but that a certain number of licences would be suspended or revoked under those provisions before it could be driven home to the minds of such that the days of being a law unto themselves were past.

It must not be thought that prior to the passing of this Act the keeping of records was an unknown activity. Certain road carriers, at any rate, kept voluminous records, records which actually covered the great majority of the information called for by the Act and regulations under it. Mr. Nicholl questioned the need for recording some items which would rarely be asked for and said it was perhaps one of the necessary evils of legislation that such tasks were imposed quite impartially upon the saint and the sinner, and the sooner the industry could bury its sinners and prove itself capable of conducting its own affairs properly without quite such a volume of red tape, the better for those remaining in business.

Dealing with matters relating to wages and working conditions, Mr. Nicholl said that the recent report of the Joint Conciliation Board showed that a very sincere attempt had been made to produce something fair to all parties and sections and also definitely practicable, as well as to present a system of wages and conditions of such a standard as could not justly be made the subject of reproach by any other transport interest.

Naturally the work of the boards had not been pleasing to everyone. There had been, and still were, a certain number of operators who had not yet grasped that an industry wishing to rank as a great public utility must be prepared to observe working conditions beyond valid criticism. The knowledge that the industry was passing from the old confused condition into a new order of reasonable uniformity in which protection of the higher rated areas against invasion from the lower rated ones would exist, was something to be greeted with genuine relief and satisfaction.

There were other features of internal regulation that had not yet developed. The encouragement of the regular provider might be a matter which would carry its weight when the renewal of licences arose, and there was no longer consideration to claimed tonnage, or in the event of applications for increased facilities. Up to the moment, however, no practical encouragement would seem to have emerged, although it must, of course, be borne in mind that the working of the Act was still in its very preliminary stages, and such being the case it would be unwise and unfair to attempt to assess its value upon the results so far obtained.

The entry of newcomers into the trade had been made very difficult, and how far existing operators would be able to extend their business was a matter for conjecture. It was to be hoped that the sound operator, offering a useful service under proper conditions, would not find that he was denied legitimate expansion, for to restrict such concerns to the extent of their operations at the passing of the Act would be a very serious injustice.

Mr. Nicholl went on to suggest that those who favoured a policy of opposing applications for additional vehicles were not looking very far ahead or fully appreciating where it might lead them. There would be opportunities for expansion through existing firms finding it impossible to adapt their methods to the new regulations and the clearing off the road of aged vehicles which their owners were not in a position to replace.

The first opportunity of measuring the true strength of railway opposition would occur in the latter portion of the present year when the first renewals of the trader-carrier licences became due, but the real test would be in the latter part of 1936 when the carriers' licences came up for first renewal, and the shelter of claimed tonnage had vanished. At the moment there would seem to be a well-founded fear as to the tendency towards universal objection by the railway companies. This policy would, of course, be influenced by the reactions of the licensing authorities to such mass objections.

Though recognising the difficulties to be overcome, Mr. Nicholl stressed the urgent importance of the organisations representing both road and railway interests getting together at an early date in the endeavour to reach some measure of agreement, with the object of eliminating or reducing the effort and expense to both sides of prolonged battles before the licensing authorities.

Mr. Nicholl concluded his paper with a plea for time—time for the 1933 Act to settle down to its normal procedure—time for the innumerable road transport units to adjust their individual operations to what, for the majority of them, was a very new basis of working—time for them to consolidate their organisation as a trade and to proceed with the putting of their house in order. Also time for the licensing authorities and the industry combined to accumulate the accurate data (hitherto unobtainable) which must form the essential preliminary to any attempt to solve this problem upon sound lines.

Next, he thought, must come the preliminary step necessary to establishing some semblance of order in the road section of the tariff question. Clearly there must be some uniformity and order in that section before the question of co-ordinating the road tariff system and the rail tariff system could be seriously approached.

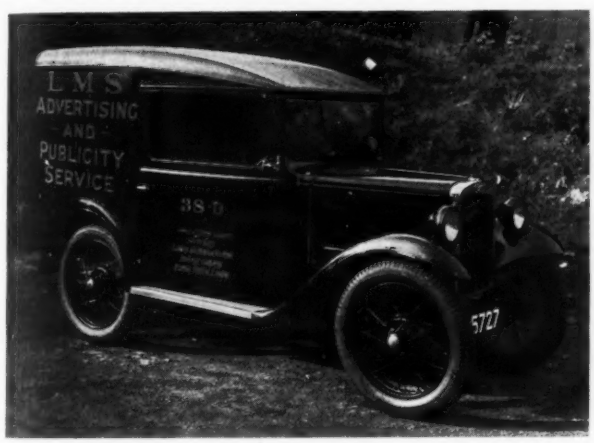
After referring at some length to the Code of Fair Competition for the Trucking Industry issued under the National Recovery Act administration in the United States of America, Mr. Nicholl advocated some such scheme controlled by the industry itself in this country.

The only other alternative to the unfettered individual competition such as had existed in the past lay in the direction of complete and arbitrary government control of tariffs, both of road and rail facilities, and from the point of national trade he was convinced such would be a retrograde step.

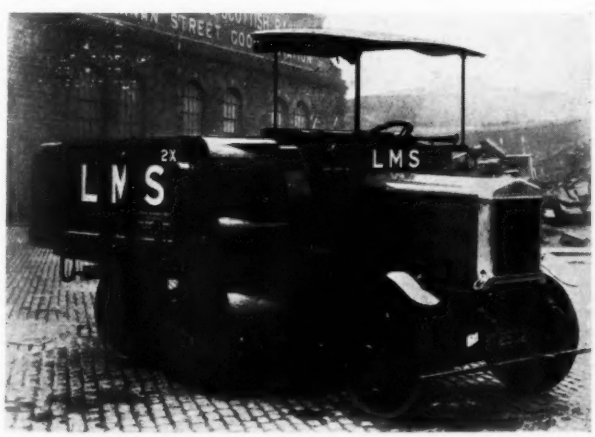
Railway Motor Vehicles for Departmental Work

Recent developments on the L.M.S.R.

DESPITE the fact that the railway companies are the largest owners of motor vehicles in Great Britain, it is usual to think of their activities in this direction mainly from the aspect of the trading services, such as the use of motor transport for collection and delivery work. But perhaps the extent is not always appreciated to which motor units have been introduced in connection with the internal or domestic operation of the railways; for example, the efficiency of goods terminal work has been increased by the use of motor shunting tractors and sweepers, and, of course, the various departments have taken full advantage of the more orthodox road motor vehicle in carrying out their duties. It will be of interest, therefore, to survey the developments which have taken place in this respect on the London Midland & Scottish Railway—as the largest of the four groups—and the table in the opposite column gives particulars of the different types of petrol-engined vehicles that have been placed in departmental service by that company.



An Austin Seven 5 cwt. van used for advertising and publicity work on the L.M.S.R.



Karrier road sweepers are included in the equipment of several L.M.S.R. stations in London and the provinces

PETROL-ENGINED ROAD VEHICLES EMPLOYED BY VARIOUS DEPARTMENTS OF THE L.M.S.R.

Department	No. of vehicles	Type	Unlader weight; tons	Stationed at :—
Permanent Way Department (lorries)	2	Fordson ..	2	Walsall, Grangemouth.
	1	Albion ..	4	Manchester (Longsight).
	1	Karrier ..	4	Stoke.
	1	Albion ..	2	Muirhouse.
	1	A.E.C. ..	5	Edge Hill.
Carriage and Wagon Department (lorries)	1	Morris ..	1	Wolverton.
	1	Albion ..	2	St. Rollox.
	2	Morris ..	1	St. Rollox, Leeds.
	1	Morris ..	2	St. Rollox.
	1	Fordson ..	1½	Stourton.
Civil Engineer's Department (lorries)	1	Ford ..	1½	Kentish Town.
	1	Karrier ..	4	Clay Cross.
Locomotive Department (lorries)	1	Ford ..	1½	Bow.
	1	Albion ..	4	Crewe.
	1	Morris ..	1½	Derby.
Chief Operating Manager's Department	19	McCormick shunting tractors	—	West Kensington, Leicester, Bristol, Tewkesbury, Bromsgrove, Gloucester, Manchester (London Rd., Oldham Rd., and Salford), Glasgow, Liverpool (Edge Hill, Great Howard St., and Crown St.), Earlestown (C. & W.).
	5	Karrier road sweepers	—	St. Pancras, Birmingham(Lawley St.), Manchester (Salford), Glasgow and Blackburn.
Hotel Services (lorries and vans)	1	A.E.C. ..	5	London.
	1	Dennis ..	2	Birmingham (Stechford).
	1	Morris .	1	Manchester.
	1	Fordson .	1½	Dornock.
Carriage and Wagon Department (ambulances)	1	Armstrong-Siddeley	—	Derby.
	1	Morris ..	—	Derby.
Advertising and Publicity Department (vans)	1	Austin 7 ..	—	London.
	1	Ford .	10 h.p.	London.
Road Motor Engineer's Department (vans)	3	Jowett .	10 cwt.	Manchester, Bradford and Blackburn.
	1	Ford ..	10 cwt.	Bradford.
	4	Ford ..	30 cwt.	London, Birmingham, Manchester and Blackburn.

Several of these Jowett 10-cwt. vans are employed in L.M.S.R. District Road Motor Engineer's Department in Lancashire and Yorkshire

A Karrier 4-ton tipper in the service of the L.M.S.R. Civil Engineer's Department at Clay Cross

A familiar sight is this Imp tractor with its little train of luggage trucks on main line platforms

International shunting tractors are to be seen working in a number of L.M.S.R. stations and goods yards

The use of motor lorries by the various departments will be readily understood; the provision of these flexible units has expedited the distribution of materials, and, in addition to raising the standard of efficiency, has often secured useful economies.

Turning to the more specialised motor units, particular interest attaches to the McCormick Deering petrol shunting tractors manufactured by the International Harvester Co. Ltd. These tractors have been introduced to cover shunting previously performed by steam or petrol locomotives, or by shunt horses. They have a wheel base of 6 ft. 6 in. and are extremely mobile. The units are fitted with timber buffer plates and have draw hooks at the front and rear so that they are capable of hauling or pushing wagons. The forward speeds are 2, 4, and 10 m.p.h. and reverse 3·8 m.p.h., the rating being 28·9 horse power. Originally, the units purchased experimentally were equipped with solid tyres which necessitated the levelling of the adjacent width of road upon which they operated to the top of the rails, but the later models acquired have been fitted with giant pneumatic low-pressure tyres which remove this difficulty. It will be appreciated that, where conditions make it possible, the replacement of, say, a steam locomotive by a road shunting tractor enables considerable economy to be secured, thus improving the net revenue position of the company.

The introduction of Karrier motor sweepers is another comparatively recent development. These units have been placed in service at selected goods depots; the machine sprinkles the roads with water and then sweeps and collects the refuse. An attendant accompanies the sweeper in order to pick up the refuse that cannot be lifted by the appliance, such as brick-ends and hoop-iron. In addition to the saving of labour made possible, the condition of the yards is improved and a saving is effected in the cost of disposing of the refuse.

Little needs to be said regarding the motor vehicles engaged in hotel service; the distribution of provisions and laundry material for the various hotels and refreshment rooms necessitates the use of rapid means of conveyance. Two ambulances at Derby are utilised for works staff purposes should accidents occur. The advertising and publicity vans are engaged in distributing literature to the town offices and auxiliary agents, and also for the conveyance of posters to sites away from stations.

In addition to the aforementioned vehicles, there is, of course, a large number of motor trucks and tractors employed at passenger stations and goods depots, while mobile cranes and rail trollies might also be legitimately brought within the nomenclature of departmental motor vehicles. Details of the allocation of petrol-engined units of these types are as follow:—

Types of vehicles	No. of units	Type	Stationed at :—
Passenger platform and works tractors	5	Imp ..	St. Pancras, Euston, Derby and Earlestown.
	4	Mercury ..	Bromsgrove, Derby (C. & W.) and Warrington.
	3	Fordson ..	Derby (C. & W.) and Earlestown (C. & W.).
	7	Bramco ..	Derby (C.M.E.), Greenock and Grangemouth.
Goods shed, passenger, platform and works trucks	8	Douglas Auto	Crewe, Newton Heath (C. & W.), Thornhill, Liverpool (Great Howard St.), Chester.
	11	Lister ..	St. Pancras, Watford, Wolverton (C. & W.), Derby (C.M.E.), Glasgow, Hamilton and Barrow.
	3	Rodemore	St. Pancras, Crewe (C.M.E.) and Dublin.
	1	Karrier Colt	Derby (C.M.E.).
Rail trollies ..	57	Wickham ..	Scotland (35), Birmingham, Dunstable, Stoke, Watford, Walsall, Blackburn and Manchester.
	3	Drewry ..	Birmingham, Stoke and Blackburn.
Mobile cranes	3 (6 ton)	Coles ..	Birmingham, Clifton and Edinburgh.
	6 (6-ton)	Walker ..	St. Pancras, Aston, Coventry, Salford, Glasgow, Garston Dock.
	3 (6-ton)	Ransomes & Rapier	Soho, Stoke and Willesden.
	1 (6-ton)	Morris ..	Burnley
	1 (3½-ton)	Ransomes & Rapier	Nottingham.
	1 (2½-ton)	Morris ..	Salford.
	5 (1-ton)	Ransomes & Rapier	Camden, Glasgow, Bradford, Sheffield.
	1 (1-ton)	Morris ..	Ettinshall Road.
	1 (1-ton)	Tilling-Stevens	Oldbury.

One of the Karrier Colt trucks used in the L.M.S.R. workshops at Derby

The use of tractors and trucks for expediting the conveyance of parcels, luggage, goods, and works materials has been widely adopted, and, in addition to facilitating movement, a reduction of handling costs has been effected by this means. Economies have also been secured in permanent way maintenance by the introduction of motor trollies to convey mobile gangs from central bases, in place of the ordinary length gangs. Another method of facilitating movement has been the provision of mobile cranes possessing considerable manœuvrability.

Apart from these various types of motor vehicles, the Road Motor Engineer's Department is responsible for the maintenance of many semi-mobile motive machines, such as spray painting appliances, petrol-driven drilling machines for maintenance work on structures and track, and petrol-driven concrete mixing machines and pumps.

WARNING SIGNS ON LEVEL CROSSING GATES.—It is announced that the Automobile Association has secured permission from the four main line railways to fix on the gates at public level crossings, reflex signs, consisting of three small round red reflectors and three small round white reflectors.

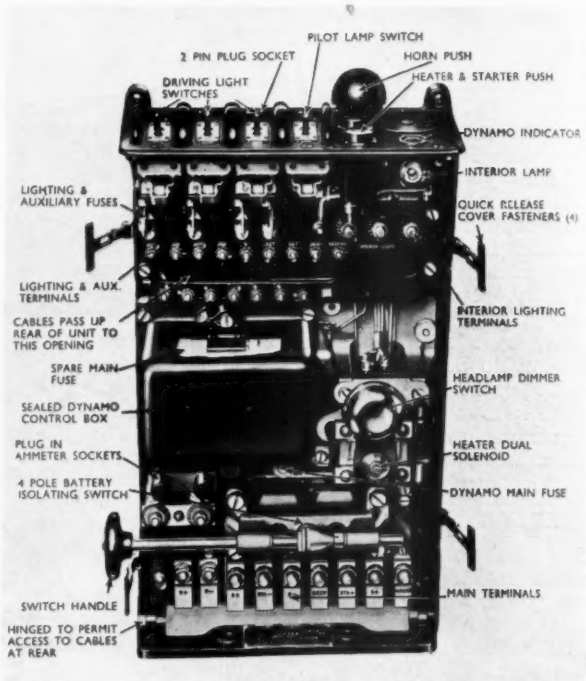
XUM

Centralised Control of Electrical Fittings

Besides making for greater convenience the new control unit introduced by the Associated Equipment Co. Ltd. has led to a reduction in wiring and a saving in total weight

FOR some time past designers of chassis for passenger and freight carrying have been directing their attention to what might be termed the co-ordination of the electrical units. One result of this effort is seen in the unit now being fitted to A.E.C. chassis. It is the result of an extensive series of tests by the company and it enables all electrical control equipment to be concentrated within a single casing that can be mounted in a position remote from engine vibration, yet adjacent to the driver for convenient operation and immediately accessible for garage service purposes. The adoption of the unit has enabled chassis wiring to be reduced by as much as 25 per cent. with a consequent saving in the total weight of the equipment.

From the illustrations on this page it will be seen that the unit is very compact. Full use has been made of the top panel to group all the most frequently used switches—those governing the head, side, tail, fog and dynamo pilot lights and, in the case of petrol-engined chassis, the ignition—and the switches are of a new robust and waterproof pattern. On the top panel is also found the heavy type starter and heater pushes; a dynamo charging indicator; a 2-pin plug for a portable inspection lamp; and a rubber-covered horn push, the position of the last-mentioned being such that it can be depressed by a slight pressure of the driver's elbow. Projecting through the front panel is a headlamp dipping switch easily located and operated by the driver without taking his attention from the road ahead. At the bottom of the unit there is a four-pole master switch, carrying the full starter current, which enables all electrical equipment to



The interior of the new A.E.C. electrical control unit

The neatness of the A.E.C. electrical control unit is emphasised in the illustration on the left. In the centre picture the driver is seen operating the headlamp dimmer, while on the right the horn switch is being pressed by the driver's elbow

be isolated from the battery; it is operated by a handle on the side of the case.

In the interior of the unit fuses and lighting terminals are mounted immediately beneath their relevant switches; inter-connections are made by riveted copper strips forming permanent connections. Lighting wires from the chassis are conducted from the bottom of the box through an insulated duct in the back panel to the terminal board. Lugs are soldered to the lighting wires and a cleat is provided to give extra security and relieve the terminal of mechanical strain. Large terminals for feeding interior body lights are incorporated. The unit is hinged at the bottom and on the removal of the two top bolts it can swing forward to expose the rear connections. The dynamo pilot lamp serves to light the interior should fuses have to be replaced in the dark.

There are a number of advantages secured by the master switch. It obviates the possibility of a run-down battery in the morning due to a driver's failure to open all the switches the previous night; or as the result of a short circuit developing in the wiring, and in the event of a short circuit its immediate use minimises the risk of fire. It facilitates testing and precludes the risk of short circuits developing when a starter is being fitted or other parts adjusted. In the garage at night it enables the cleaner to operate interior lights without having to clamber into the cab.

A voltage regulator and dynamo cut-out is contained in a small sealed cover; in the event of failure it can be detached readily. For the purpose of checking dynamo output an ammeter is incorporated permanently in circuit and into this can be inserted the plug of a portable ammeter.

The unit is being made only for A.E.C. by C.A.V.-Bosch Limited and Simms Motor Units Limited. It is being made with a standard exterior casing with varying interior units according to the type of chassis to which it will be fitted.

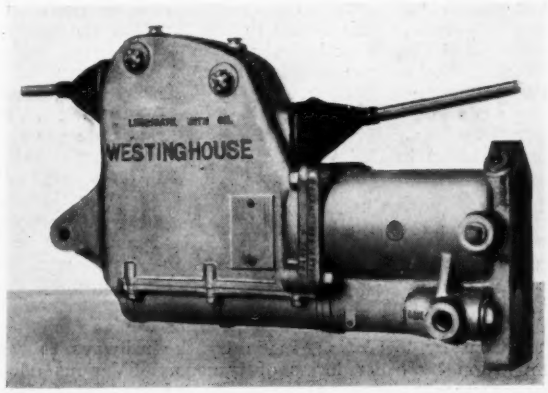
Air Pressure Servo for Road Vehicle Brakes

The scheme of the Westinghouse pressure servo designed to provide power-assisted braking on road vehicles on which the braking force is transmitted through mechanical rigging. It can also be applied to a hydraulic braking system

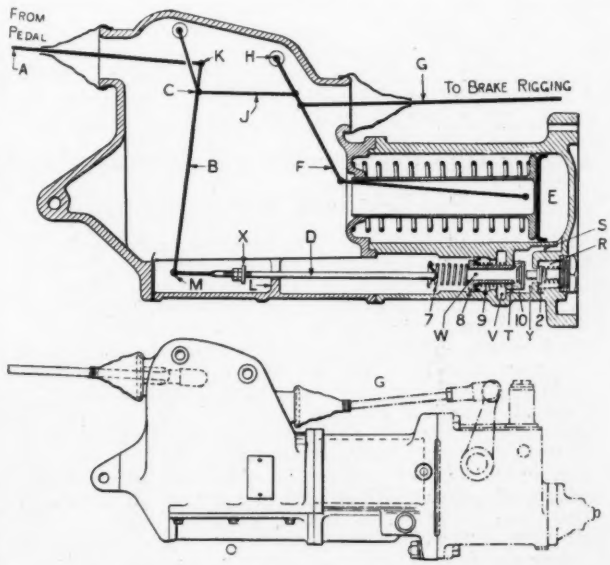
AMONG the interesting claims made on behalf of the latest Westinghouse air pressure servo introduced by the Westinghouse Brake & Signal Co. Ltd. is that sufficient reserve of pressure can be maintained in the reservoir to enable a considerable number of brake applications to be made should the engine be temporarily out of action. In the design of this mechanism there are embodied several well-tried features, the valve portion, for example, being of the same type as in the improved Westinghouse driver's control valve for air pressure brakes. The servo unit is quite compact in its design and the weight has been kept down by the utilisation of an aluminium alloy for the lever housing, cylinder and piston. The Westinghouse pressure servo has been designed for braking systems with mechanical rigging, but it can be applied to hydraulic schemes by bolting the hydraulic master cylinder on to the end of the servo as shown in one of the diagrams we reproduce.

With the aid of the other diagram the action of the servo operation can be followed. When the brake pedal is depressed, rod A moves to the left and, after taking up any slack in the rigging, lever B is turned about C, moving control valve rod D to the right, compressing spring 7, while piston 8 is moved to the right against the effort of the release spring 9, first closing exhaust valve 10 and then opening inlet valve 2. Compressed air flows past valve 2 into chamber Y and through port S to the brake cylinder E behind the piston and applies the brake.

Air flows from chamber Y through a small hole T to chamber V behind piston 8 where the pressure builds up until it is sufficient to overcome the force of the spring 7



The neat appearance of the Westinghouse servo motor is shown in this illustration



Above, diagrammatic sketch showing the working of the Westinghouse air pressure servo and, below, sketch showing how the servo can be fitted to an hydraulic braking system

XUM

and moves piston 8 to the left, allowing inlet valve 2 to reseat, so that the brake is held applied by the air pressure in the brake cylinder. Additional pressure on the pedal causes a repetition of this cycle of action and therefore the force on the brake pedal results in a directly proportional force on the brake cylinder piston, which is transmitted through F and G to the brake gear. The maximum force is controlled by the adjustable stop X.

When the pressure on the pedal is relieved, rod A moves to the right and the consequent movement of lever B takes rod D to the left, relieving spring 7. The pressure of air to the right of piston 8 overcomes the force of the spring 7 and the piston moves to the left and opens the exhaust valve 10, allowing air from the brake cylinder and chamber V to escape to the atmosphere through the port W until the pressure on the right of the piston has been reduced sufficiently to allow the spring to move it to the right and close the exhaust valve once more. The inlet valve remains closed during this operation.

Should the air supply not be available, the initial pedal movement will turn lever B until X comes into contact with the body at L. Then B will turn about the point M and the force on the pedal will be transmitted through J and G to the brake rods. A connection to chamber E is provided so that, when desired, separate cylinders may be used for the front wheel brakes. It may also be noted that an air strainer is incorporated in the control valve to ensure that no foreign matter finds an entry. The 68 Leyland and 52 A.E.C.-English Electric trolley buses on order for London Transport, as well as the 30 trolley buses for Newcastle and the 15 for Bradford Corporation, are being fitted with Westinghouse air brakes.

Railway Trucks on the Road

IN recent months we have recorded in THE RAILWAY GAZETTE developments in Germany and Italy in the direction of road-carriers for railway trucks. On April 1 Herr Reichsbahndirektor Dr.-Ing. Hans Culemeyer, who has been in charge of this development on the German State Railway, gave a lecture on the subject before the Engineers' German Circle at the Institution of Mechanical Engineers. Dr. Culemeyer's lecture was copiously illustrated with lantern slides and three cinematograph films, so that the way in which this transport problem has been approached and solved, and the field of usefulness of the new road-carrier, could be followed and understood even by those whose knowledge of the German language is only slight.

Dr. Culemeyer began his lecture by illustrating some exceptional loads which had to be carried partly by road before the invention of the road-carrier. The weight on each wheel of the supporting lorry often greatly exceeded the loading on the heaviest express locomotive, so that damage to roads frequently resulted. The invention of the road-carrier, however, was far from being only a means of carrying such loads in a manner which distributes the weight over a large road surface. The ability to carry railway vehicles with their loads through the streets at once solved the problem, pressing in some parts of Germany, of the factory without rail connection to the Reichsbahn. Road-carriers for taking trucks and vans, loaded especially with mass materials such as coal and cotton, direct to the factory, thus saving two handlings, are now in use in five cities in Germany. The scheme was illustrated in our issue of October 26, 1934. Fifteen carriers are in commission, fifteen are on order, and another thirty are to be ordered.

In order not to detain the carrier whilst the truck remains at the factory, a transportable length of track, just sufficient to hold the truck, may form part of the equipment. It is so designed that the truck can be drawn from it on to the carrier and *vice versa* in a few minutes. A further remarkable development is the laying down of a few lengths of siding at the factory, where several railway vehicles at a time may stand.

The latest road-carrier illustrated by Dr. Culemeyer, though it is only just nearing completion, is a tipping carrier. A 20-ton wagon may be tipped endwise, as in a docks coal-tip, by means of a hydraulic piston. Its design was rendered more difficult by the necessity of holding the truck sufficiently high to enable the buffers to clear the road surface at the maximum angle of inclination. At the conclusion of the lecture, Dr. Culemeyer showed a film of the recent demonstration in which a Mitropa dining car was towed through the streets of Berlin on a special road-carrier for bogie vehicles, whilst a full luncheon was served on board to officials of the German State Railway and representatives of the press.

Publications Received

Railway and Highway Transportation Abroad. A Study of Existing Relationships, Recent Competitive Measures, and Co-ordination Policies. By W. Rodney Long. Washington, U.S.A.: U.S. Department of Commerce, Government Printing Office. 9 in. by 5¾ in. 426 pp. Paper cover. Price 50 cents.—All who are concerned with the co-ordination of transport by rail and road will find much valuable information in this book just published in the United States. Its title and sub-titles succinctly describe its scope. To some extent it covers the same ground as "Road and Rail in Forty Countries," the report prepared for the International Chamber of Commerce, which was reviewed in THE RAILWAY GAZETTE of January 18 last, but in a number of ways it is more complete. Actually there are some ninety countries dealt with, and while some of them require but a few lines to state the facts, others take many pages. By the latter criterion it would seem that Great Britain leads the world in efforts at co-ordination, for more than fifty pages are taken up with the summary of the licensing systems for passenger and goods vehicles. On the other hand, in a paragraph on Honduras we learn that the necessity for eliminating competition between highway carriers (which are entirely unregulated) and the railways does not now—and in all probability never will—exist. This is due to the fact that the railways are restricted almost exclusively to the north coast region, connecting the banana plantations to the seaports, where highways are non-existent. In the southern and central sections of the country the position is exactly reversed. The material for this study was obtained from replies to questionnaires directed to U.S.A. officials in the different countries and from various unofficial sources, and tribute is paid to the assistance rendered in this way by THE RAILWAY GAZETTE. The study is the work of Mr. Rodney Long of the Transportation Division of the U.S. Bureau of Foreign and Domestic Commerce, and in addition to the summaries of what has been done in the various countries, there are chapters dealing with the new equipment introduced by the railways to facilitate co-ordination and to meet competition, as well as the efforts, other than by legislation, made by the railways to meet competition by other forms of transport. Various official pronouncements, such as the report of the International Railway Congress Association on road-rail co-ordination, are printed in appendices. There are a number of illustrations of vehicles, and containers, as well as charts and maps.

NEW AXLEBOX REPAIR LAYOUT AT SWINDON WORKS, GREAT WESTERN RAILWAY

The plant for this work has been entirely remodelled and rearranged on the progressive system

AMONG other improvements recently instituted at the Swindon works of the Great Western Railway is a new axlebox repair layout. This is composed of two sections known as the " before appropriation " and " finishing " stages. The standard axleboxes are of the cast steel type with bronze liners pegged to the flats and flanges, pressed-in crown brasses and white-metal bosses. A plan of the layout is shown in Fig. 1.

After stripping down in the erecting shop the axleboxes and keeps are loaded on a tray, which is passed through a bosh for cleaning and delivered alongside the first section of the axlebox conveyor without intermediate handling. They are unloaded from the bosh tray on to the first section of a Morris roller conveyor, where the crown brass bolts are removed and the pegs securing the bronze liners centre-popped for drilling out. After passing through the hydraulic press " A," where the crown brass is pressed out, the pegs are drilled on either of the two radial drilling machines " B." The keeps are examined, the spring pin holes, if necessary, filled up, and the components stacked in readiness for reassembly in the boxes again at the second hydraulic press. The stops, crown bolts and covers are sorted into convenient bins to be available at the finishing benches. After drilling the pegs and boxes pass to bench " C," whereon the pegs are removed by drift and wrench, liners removed, and boxes examined. If any welding is required they are removed from the circuit and re-introduced after welding, slotting and re-drilling. New flange liners are fitted and clamped in position and new flat liners fitted and marked off.

On the drilling machine " D " the flange liners are drilled and tapped through, the flat liners drilled and countersunk. Flange pegs are inserted, cut off and riveted by hand, and box moved to bench " C1," on which the first flat liner is replaced and pegged. The pegs which are in the form of screwed steel wire in foot lengths, are screwed into the axlebox and cut off by a portable pneumatic shears, this being in balanced suspension from an overhead jib. A ferrule is slipped over each wire in order to cut off at the desired projection. The pneumatic shears has superseded the previous method of using a hacksaw, giving a great benefit in time and effort. Two shears are shown in operation in Fig. 2.

With the pegs cut off the box is moved to a Jackson & Hunt toggle action pneumatic riveting press, which is also fitted with a plate closing attachment and traversing table to enable the full area of the axlebox to pass under the snap. The machine is operated by a pedal control, and in addition there is a reducing valve for modifying the effective pressure on the snap, this generally being set at about 60 lb. per sq. in. The box is then turned over and placed on a stand for inserting the liner and pegs in the second face and returned to the press for riveting. The press and riveting stands are served by a radial jib with compressed air lifting cylinder, which can be seen in Fig. 2, together with the peg riveting machine and pegging stands. After riveting the second face the box is deposited on to the next conveyor, from which it passes through the operations of fitting new crown brass at press " G," and thence from the conveyor by overhead runway to the boring mill " F," for facing off the crown brass and serrating the face. From the boring mill the runway conveys it to and from the white-metalling bench, one boss being faced, after metalling, on the boring mill to facilitate the setting for subsequent planing. The keep is fitted at either of the presses " G " and the axlebox is chalked with the number of the engine to which it is appropriated, which number is taken from a daily list of

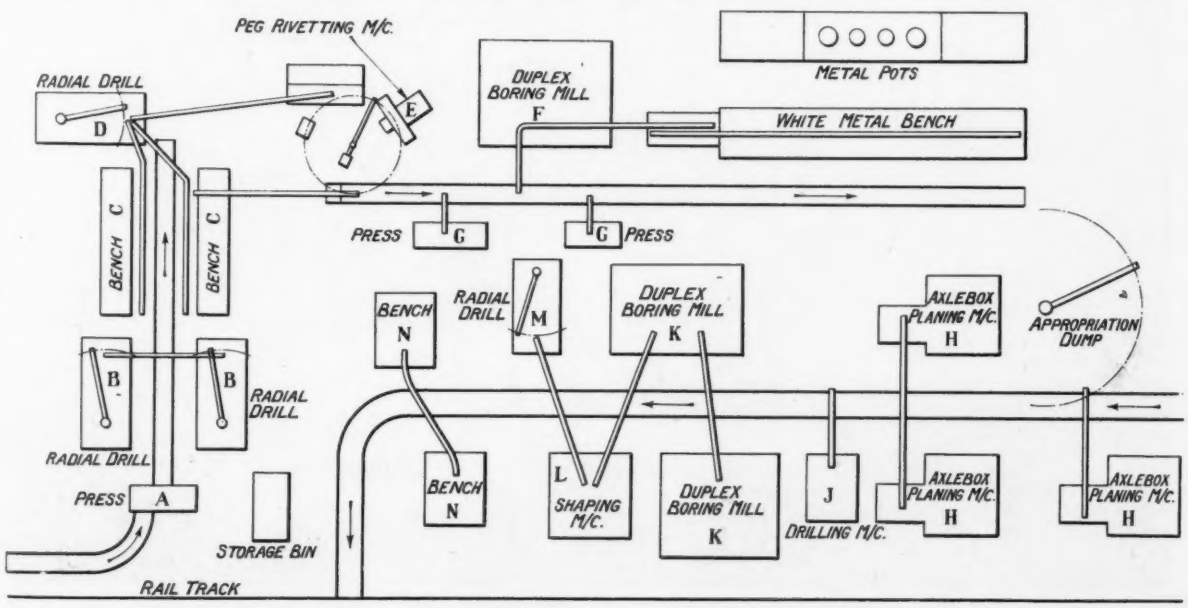


Fig. 1—Plan view of new axlebox repair layout at Swindon locomotive works, G.W.R.

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Fig. 2—Axlebox repair "before appropriation" stage. Cutting off pegs, riveting press, and radial jib and keep filling presses

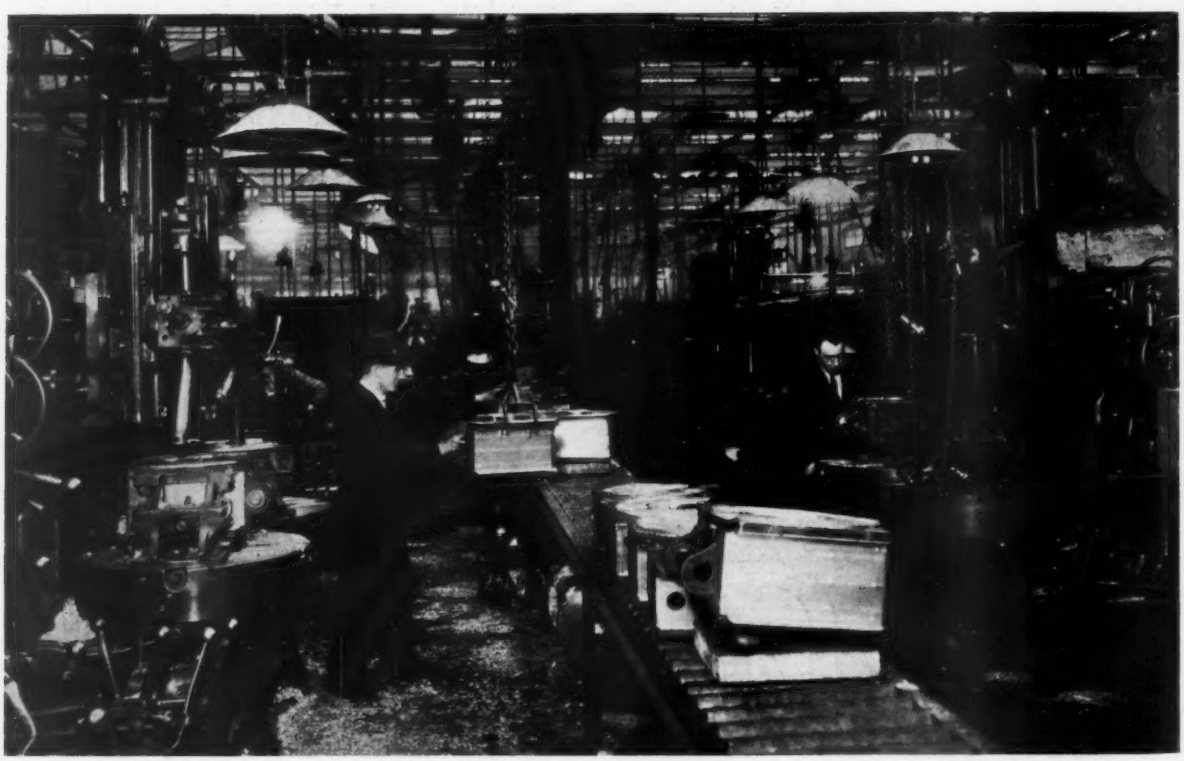

Fig. 3—Finishing section of axlebox plant at Swindon, with duplex boring machine in foreground

engines coming in for repairs. A certain floating stock of boxes is maintained which enables a repaired set to be allocated to each engine within a day or two of the day on which repairs to the engine are commenced. The box is then replaced on the conveyor and moved by gravity to the appropriation dump.

The second or " finishing " stage is commenced upon receipt of the sizes from the erecting shop, the inspection department staff of which is responsible for combining the horn dimensions with those of the journals and bosses. They are transmitted to the machine shop on dimension slips detached from a perforated book, each slip, as shown herewith, bears the complete sizes for one axlebox. The slips fit into a metal frame with a spring clip. The clip enables the slip to be attached and detached readily to and from the box on which it travels down the finishing conveyor and with which it remains until the box has been examined immediately before being despatched to the erecting shop.

The first operation of planing is performed on one of three Butler axlebox planers " H " with self-contained electric drive, situated on either side of the conveyor. The table is provided with self-centring jaws and dimension stops finally holding the box in position by two central bolts and clamps. It has been the practice for many years to set locomotive frames so that all axleboxes are bored centrally with horn faces and, therefore, to set the dimension stops a micrometer set to the horn width dimension, less a feeler allowance for tool clearance, is placed across the stops which are brought out to the micrometer jaws by a right and left handed screw. The two tools are set to the measuring stops by feeler and the limiting screws on the cross feed adjusted accordingly. Both tools are set for height from a stick gauge from the table face and are then fed into the lower flanges until the set width over faces is reached, allowing from the tool stop about 0·020 in. for finishing cut. The tools are then fed upwards simultaneously planing both faces until they reach the upper flanges, at which point they are withdrawn outwards and set by stick gauge to give the correct height from the lower machined flange. They are now fed inwards, machining the upper flanges, until the tool stops reach their setting and then self-act downwards on the finishing cut.

After planing, the spring pin holes are drilled out and reamered on the fixed head drilling machine " J," manufactured by The Coats Machine Tool Company of Westminster, and the boxes are then bored and faced on any of the four heads of the two Webster & Bennett duplex boring mills. Chucks of Swindon design are provided to enable the boxes to be self-centred and for the crowns to be moved inwards for counterboring. The remaining operations are undertaken in the order of shaping for flange clearance, drilling to recess the face liner pegs and to drill and tap the crown brass bolt holes on the radial drill " M," finishing and fitting covers, stops, &c., on the benches " N," and final inspection on the last portion of the conveyor from which they are transported by petrol electric tractor to the erecting pits.

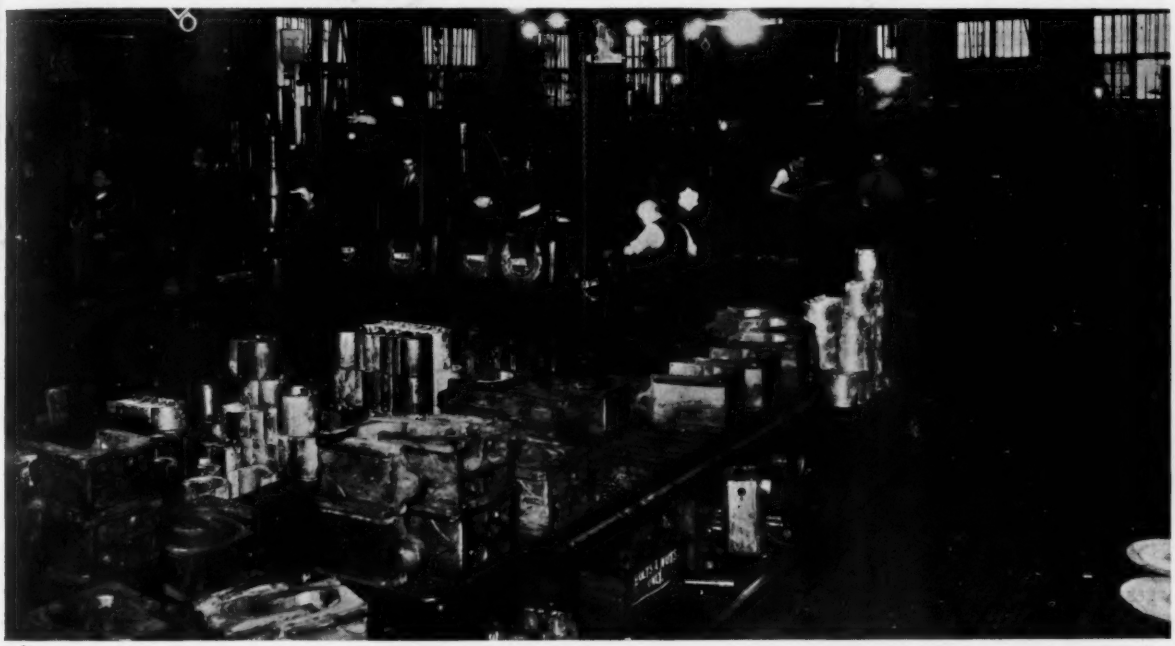

Fig. 4—View of first and last stages in conveying axleboxes

A view of the finishing section is shown in Fig. 3, while Fig. 4 shows the beginning and ending of the conveyors. The one in the foreground is receiving the axleboxes direct from the bosh, while in the middle of the photograph is the end of the finishing section and shows a batch of axleboxes, passed inspection, ready for transport to erecting shop.

In addition to the firms mentioned above, others whose machines are included in the plant include W. Asquith & Co. Ltd. and James Archdale & Co. Ltd., radial drilling machines, Electroflo Meters Co. Ltd., white-metal melting indicating control pyrometer. The hydraulic presses, compressed air radial jib and compressed air cutting guns were produced in the Swindon works by the company's workmen.

Our thanks are due to Mr. C. B. Collett, O.B.E., Chief Mechanical Engineer, Great Western Railway, for giving us facilities for inspecting the work and preparing this article.

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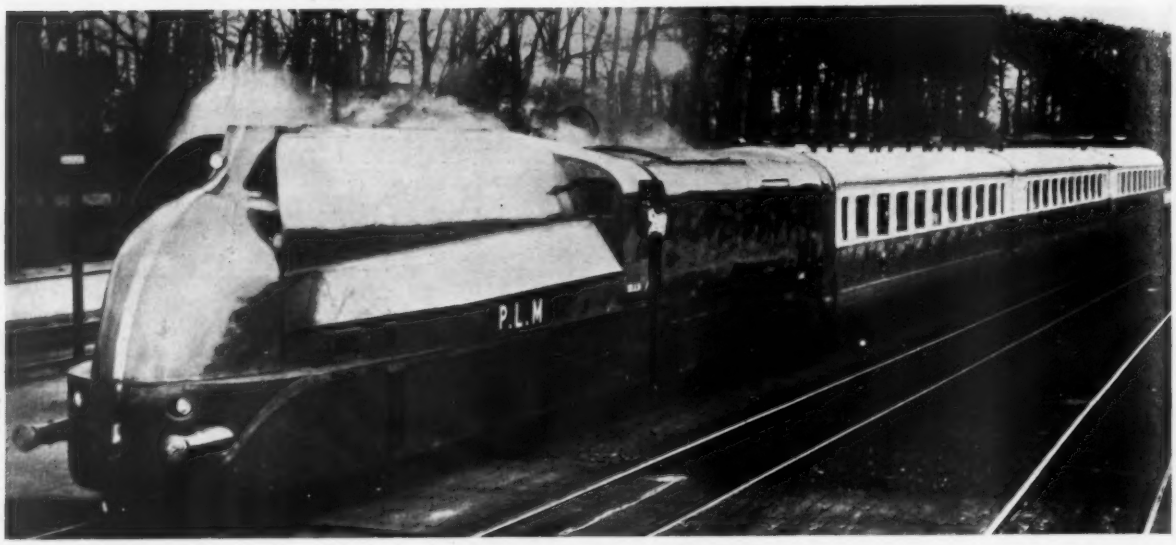
NEW STREAMLINED STEAM TRAIN ON THE P.L.M.



An Atlantic type locomotive and three coaches completely streamlined have been running trial trips on the P.L.M. between Laroche and Paris and are said to have reached speeds in excess of 100 m.p.h. The train at Laroche

A NEW PETROL-DRIVEN WORKSHOP TRUCK

WE drew attention in our issue of March 31, 1933, to the introduction by the L.M.S.R. of the Laycock petrol-driven workshop trucks, and gave details of the operation of the system in the sheet stores at St. Helens. The manufacturers of this truck have now introduced a larger machine of increased capacity, including many refinements, and there is undoubtedly a wide field for its use in railway work of various descriptions.

The new Laycock truck has been designed primarily for handling parcels on railway station platforms and the transit of goods in goods yards, and examples are already in use in several works. The overall length and width are such as to ensure easy manœuvring inside congested buildings, and they are also suitable for short distance road transport. An outstanding feature is the four-cylinder water-cooled engine, which ensures extreme quietness and perfect combustion—features hitherto not greatly in evidence in the majority of factory trucks. Excellent acceleration and very even running at low speeds facilitate driving, especially when gangways and narrow doorways have to be negotiated.

The engine drives the fully floating rear axle through a two-speed constant-mesh gearbox in which is incorporated a direct reverse. The truck is mounted upon four wheels, which are fitted with solid rubber tyres of 17 in. dia. at the rear and of 16 in. dia. for the front steering wheels. Alternatively, 18 in. dia. pneumatic tyres can be fitted. All trucks are designed for two-ton loads.

Hauling trailers, the Laycock truck can transport 8 tons on the level, and running alone, with platform fully loaded, it can surmount the steepest gradients to be found in most works. Either coil or magneto ignition can be arranged for.

The control of the Laycock truck is the same as that of a standard motor lorry, *i.e.*, foot pedal to clutch; foot brake and foot-operated throttle; gear-lever readily accessible at the right-hand side of the driver's seat. The unladen weight of the vehicle is approximately 19 cwt.; the wooden platform measures 6 ft. 6 in. × 4 ft. 0 in.; overall length, 9 ft. 0 in.; height of platform above ground, 22 in. In the transmission, a metal-to-metal expanding clutch is used and is incorporated in the gearbox. Two forward speeds and reverse are provided, giving overall reduction ratios of 15·64 to 1 and 34·4 to 1. A reduction of 5 to 1 is effected through a pair of constant-mesh gears, which convey the drive from the near side of the vehicle (*i.e.*, the engine line) to a central position; a further pair of gears is provided which, by the engagement of dog clutches, gives the high and low speeds. A short propeller shaft, with universal joints at the front and rear, transmits the drive to a bevel-type rear axle fitted with differential.

Laycock petrol-driven workshop truck in service

RAILWAY NEWS SECTION

PERSONAL

The funeral of Mr. F. C. Coleman, Managing Director of our contemporary *Modern Transport*, whose death in Cape Town we announced in our issue of March 15, will take place at Esher Parish Church at 2 p.m. on Saturday, April 13.

The Secretary of State for the Colonies has recently made the following appointment: Mr. A. J. C. Taylor, Accountant, Police Department, to be Chief Accountant, Kowloon-Canton Railway, Hong Kong.

INSTITUTE OF TRANSPORT

The following corporate associate member has been elected, and non-corporate graduates and students have been admitted during March:—

Associate Member

Mr. W. Miller, L.M.S.R.

Graduates

Messrs. G. E. Angus, South African R. & H.; A. McK. Baird, Southern Railway; C. W. Bathurst, L.P.T.B.; P. R. Brown, H.E.H. the Nizam's State Railway; M. J. Collins and J. F. Jones, G.W.R.; J. P. Daley and T. J. Normoyle, New South Wales G.R.; C. T. Hutson and G. L. Paton, Kenya & Uganda R. & H.; A. Robinson and V. H. Whitehead, L.M.S.R.; R. M. Fenton, C. Grainger, E. W. S. Simson and L. Woolley, L.N.E.R.

Students

Messrs. L. H. Axford, G.W.R.; E. D. Bailey, L.N.E.R.; S. W. Daneel, S. H. Du Plessis and A. A. Verster, South African R. & H.; V. F. Dennett and D. McKenna, L.P.T.B.; C. H. Fetch, W. T. Goddard, H. P. Isterling and J. J. H. Rippin, L.M.S.R.; J. K. C. McGregor, G.W.R.; K. R. Patel, Gaekwar's Baroda State Railway.

Mr. M. N. Varvill, M.C., M.Inst.C.E., Chief Engineer, Rhodesia Railways, has been granted leave on termination of his 10 years' appointment, as from March 25. Mr. Varvill was trained at the Royal Indian Engineering College, Cooper's Hill, and went out to India as an Assistant Engineer on State Railways in 1904. He was promoted to the rank of Executive Engineer in 1912 and, on the outbreak of war, proceeded to East Africa with the British Expeditionary Force, where he served from 1914-1918 with the temporary rank of Captain in the Royal Engineers and was awarded the M.C. During the past ten years he has been responsible for many important works including the location and construction of the 72-mile line between Deka River and the Victoria Falls, the strengthening and modification of the bridge at the falls to take road traffic, the Pungwe flood protection works on the Beira line, as well as various branch line constructions and open-line improvements. Mr. Varvill recently acted as General Manager for six months during the absence of Mr. H. Chapman, C.B.E.

Mr. A. R. Gundry, M.I.E.E., M.I.Mech.E., Chief Electrical Engineer, East Indian Railway, is shortly proceeding to England on leave preparatory to retirement after 28 years in India, for 25 of which he has been in charge of the Electrical Department of one of the State Railways. Mr. Gundry received his technical education at the City and Guilds Finsbury College, London, and his practical training he obtained with J. Stone & Co. Ltd. and Siemens Bros. In 1900 he joined the St. Pancras Borough Council

Mr. A. R. Gundry, M.I.E.E., M.I.Mech.E.,

Chief Electrical Engineer, East Indian Railway, 1928-35

Electricity Works and, five years later, the Bermondsey Borough Council Electricity Works. In 1907 he was appointed by the Secretary of State for India to take charge of the electrification of the Calcutta Mint. In 1910, however, he was transferred to the Eastern Bengal Railway, where he was responsible for the complete electrification of two important locomotive and carriage workshops, including the design and installation of two large power houses. Mr. Gundry was Consulting Electrical Engineer to the Indian Munitions Board in 1918-19. It was in 1928 that he was appointed Chief Electrical Engineer to the East Indian Railway, where he has been responsible for a number of important new works. The electrical plant on this railway includes a number of large power houses and over 37,000,000 units are distributed annually for lighting and power at the various railway stations, workshops and collieries; the capital value of this plant is nearly £1½ million. Mr. Gundry has been a prominent member of the electrical section of the Indian Railway Conference Association since its inception, and was chairman in 1929-30; he has also been chairman of a number of committees convened to report on electrical matters concerning railways in India.

Mr Frank D. Playford has been appointed General Sales Manager of the Superheater Co. Ltd.

The funeral of Mr. C. B. O. Clarke, whose death we announced last week, took place on April 2, at St. Nicholas Church, Tooting Graveney. Simultaneously a memorial service for him was held at St. Dunstan's-in-the-East. Among those present were:—

Sir Sam Fay; Mr. C. H. Barfoot (representing Sir Herbert Walker); Mr. C. Furber (G.W.R.); Mr. W. A. Jepson; Mr. A. Read (representing the Powell Duffryn Colliery groups); Mr. T. S. Bolton (A. Pearson and Dorman Long); Mr. A. Peech (United Steel); and a host of associates in the colliery interests.

Mr. W. M. Codrington, M.C., Chairman of the Central Africa and Nyasaland Railways and a Director of the Trans-Zambesia, Cordoba Central, Great Western of Brazil and Madeira-Mamore Railways, has been elected a Director of the Sun Insurance Office and of the Sun Life Assurance Society.

L.M.S. APPOINTMENTS

The following appointments have been approved by the directors:—

Chief Commercial & Chief Operating Managers' Departments

Mr. R. C. Workman, Goods Agent, Northampton, to be Goods Agent, Haydon Square.

Mr. E. W. H. Powell, H.O. Inspector, Chief Operating Manager's Office, Euston, to be Goods Agent, Northampton.

Mr. E. Talbot, Goods Agent, Walsall and Bloxwich, to be Joint Goods Agent, Walsall and Bloxwich, L.M.S. and G.W.R.

Mr. J. E. Rigby, Assistant Agent for Accounts, District Goods Manager's Office, Manchester, to be Goods Agent, Burnley.

Mr. S. Hurst, Yardmaster, Healey Mills and Horbury Junction, to be Stationmaster, Bolton.

Chief Commercial Manager's Department

Mr. C. A. Mann, District Canvassing Agent, Middlesbrough, to be Chief Canvasser, District Goods Manager's Office, Liverpool.

Chief Operating Manager's Department

Mr. G. Lumby, Yardmaster, Crofton Junction, to be Yardmaster, Healey Mills and Horbury Junction.

Mr. H. Brook, Yardmaster, Leeds (Copley Hill), to be Yardmaster, Crofton Junction.

XUM

Making the G.W.R. Centenary Film

Fox] [Photos

Fox] [Photos

Fox] [Photos

Swindon] [Press Ltd.

Fox] [Photos

Following the scenes recently "shot" at Bristol, as recorded in our March 8 issue, further progress was made last week-end at Swindon depicting the arrival of the first train at Maidenhead. In addition to professional artistes, over 200 members of the G.W.R. Operatic Society assisted, as well as directors and officers of the company. Amongst the G.W.R. directors and officers, wearing the dress of 100 years ago, shown in the photographs reproduced above are: Mr. Charles J. Hambro, a Deputy Chairman; Sir John Cadman, and Sir Watkin Williams-Wynn, Bt., Directors; and Mr. F. R. E. Davis, Secretary

G.W.R. Centenary Film

(*See illustrations opposite*)

The Great Western Railway Company is producing a sound film which will deal with the historical aspect of the building and development of a great transport undertaking with special reference to a number of outstanding incidents in the company's history, as well as the part which it plays in modern life.

In order to ensure the accuracy of the episodes depicted in the film, many months have been spent in research work and in examining the interesting collection of exhibits and records in the possession of the company. It will be the first time that such a subject has been dealt with by means of a film, and the company is to be congratulated upon its enterprise in embarking on such an ambitious production. The film will be released to coincide with the G.W.R. centenary celebrations, which are to take place in August of this year, and the project has already aroused considerable interest on account of its popular and topical nature.

The production is being carried out by Merton Park Studios, under the direction of Walter Creighton, and such well-known artistes as Donald Wolfit, Carl Harbord, Robert Rendel, Bryan Powley, and Betty Shale have been engaged to represent famous public personalities connected at various times with the company.

In addition to professional artistes over 200 members of the G.W.R. Operatic Society have become film actors for this event, as well as the following directors and officers of the company: Mr. Charles J. Hambro, a Deputy Chairman; Sir John Cadman and Sir Watkin Williams-Wynn, Bt., Directors; Mr. F. R. E. Davis, Secretary; Mr. R. G. J. Barefoot, District Goods Manager, Bristol; Mr. S. W. Moore, Divisional Engineer, Bristol; and Mr. W. N. Pellow, Divisional Locomotive Superintendent, Bristol.

80 m.p.h. Schedules in Germany

(*See editorial note on page* 678)

With the inauguration of the summer timetables in Germany on May 15, start-to-stop timings in excess of 80 m.p.h. will be introduced for the first time in railway history. The Flying Hamburger will continue to wend its 77-m.p.h. way between Berlin and Hamburg, but improved vehicles to the same general design are shown in the timetable to be put into service between Cologne and Frankfort respectively and the German capital, and in the course of these journeys intermediate start-to-stop schedules of 80·3 to 82·3 m.p.h. are to be observed. The Berlin-Cologne service has been referred to already in the *Diesel Railway Traction Supplement* for February 22.

Leaving Cologne (Hbf.) at 7.00, Berlin (Friedrichstrasse) is to be reached at 12.20 after stops at Düsseldorf, Duisburg, Essen, Dortmund, Hamm, Hanover, and Berlin (Zoo), the 5 hr. 20 min. overall time for the 359·6 miles being equivalent to 67·5 m.p.h. The return journey will begin at 19.11 and Cologne will be reached at 0.18, with the same intermediate stops, except that at Duisburg, the gross time of 5 hr. 7 min. representing overall average speed of 70·5 m.p.h. On the down trip the 157·7 miles from Berlin (Zoo) to Hanover (Hbf.) will be covered in the unprecedented time of 115 min., giving a start-to-stop average of 82·3 m.p.h. compared with the 121 min. and 78·2 m.p.h. of the up journey. From Hamm to Hanover on the morning trip, the 109·7 miles are to be covered in 84 min. at 78·4 m.p.h. and the addition of only one minute to the timing in the opposite direction brings down the speed to 77·7 m.p.h.

The second new high-speed diesel service will run between Frankfort and Berlin via Leipzig. Leaving Frankfort (Hbf.) at 6.40, (an hour which would be considered inconveniently early in England, but which is not so in Central Europe), stops are to be made at Erfurt and Leipzig (Hbf.), and Berlin (Anhalter) reached at 11.46. The average speed over the 334·9 miles of the whole journey will be thus 65·8 m.p.h., but by covering the 102·3 miles from Leipzig to Anhalter in 76 min. the start-to-stop speed over this section will be 80·9 m.p.h. Here again the addition of only one minute brings the timing in the reverse direction below 80 m.p.h., to 79·6 to be precise. On the evening journey Anhalter station is to be left at 18.24 and Frankfort reached at 23.29 after stops at Leipzig, Weissenfels, and Erfurt, the overall time being one minute more, and the time between Leipzig and Erfurt the same as on the up run despite the insertion of a one-minute stop at Weissenfels to make a connection with Halle.

A feature of both the Cologne and Frankfort services is the excellent connections which they will make along their routes and also, at Berlin, with the trains to East Prussia, Poland, and Lithuania. The Hamm stop will enable travellers from Elberfeld and Hagen to join the train, and from the Hanover stop a connection will be given to Leipzig and Dresden by way of Magdeburg and Halle, reaching Leipzig at 14.01 and Dresden at 15.56. In the reverse direction it will be possible to leave Eydtkuhnen, on the Lithuanian frontier, at 8.56, and Königsberg at 11.00, and after passing through the Polish Corridor on a D train, reach Berlin in time to catch the Cologne high speed railcar from Friedrichstrasse at 19.11.

Before the end of the summer, high-speed diesel services are to be introduced also between Munich and Berlin and Cologne and Hamburg. As in the case of the Cologne and Frankfort routes, these services will allow business men to leave home in the morning, spend a full afternoon in the capital (or in Hamburg with the Cologne-Hamburg service), and return home the same night. Munich will be left at 6.31 and, after four-minute stops at Nuremberg and Leipzig, Berlin (Anhalter) will be reached at 13.20, the 418·8 miles having been covered at an overall speed of 61·4 m.p.h., the reduced rate compared with the Rhine-Berlin trains being due to the more heavily-graded route. In the evening Berlin is to be left at 17.05 and Munich reached at 23.54 in the same time of 6 hr. 49 min. as in the up run.

Between Cologne and Hamburg, stops at Düsseldorf, Duisburg, Essen-Altenessen, Wanne-Eickel, Münster, Osnabruck, and Bremen are to be made by the diesel train leaving Cologne, (Hbf.) at 7.00 and reaching Hamburg (Hbf.) at 11.18, the 4 hr. 18 min. overall time representing a speed of 65 m.p.h. This meritorious performance is bettered on the return trip starting from Hamburg at 20.00 and arriving in Cologne at 0.06, which is equivalent to an average speed of 68·2 m.p.h. including the same seven stops.

For the operation of the four services described, both 820 b.h.p. twin-articulated and 1,200 b.h.p. supercharged triple-articulated sets will be available, and so far as power output is concerned the schedules should be well within the capacity of both types. As in the Flying Hamburger, second class accommodation only will be provided (with a buffet service) and in fares these diesel units will be classed as FD trains. Although no mention is made in the recently-published summer timetables, we believe that a similar service between Berlin and Königsberg will be introduced before the end of the year on a schedule of approximately 70 m.p.h., and between Berlin and Dresden at about 69 m.p.h.

ADDITIONAL WAREHOUSE ACCOMMODATION AT SCUNTHORPE. — The L.N.E.R. is about to erect a new warehouse at Frodingham and Scunthorpe station to provide additional storage accommodation. The new building will have a floor space of 2,268 sq. ft. and will be electrically lit throughout.

XUM

PARLIAMENTARY NOTES

Anglo-Indians and Indian Railways

In the House of Commons in Committee on April 4 some discussion took place on an amendment moved by Sir Reginald Craddock to Clause 231 of the Government of India Bill. The clause deals with appointments to and persons serving in the railway services of the Indian Federation. The amendment provided that the Federal Railway Authority in recruitment to superior posts and in recruitment generally for railway purposes shall have regard to the past association of the Anglo-Indian community with railservices in India. Sir Reginald expressed the fear that unless protection was given them in every way possible the Anglo-Indians would fall into the flotsam and jetsam of the big cities and would become a remnant of a depressed class.

In the course of the discussion,

Sir H. Page Croft contended that everything possible should be done to prevent the doom of the Anglo-Indians under the proposed reforms. Their position was tragic. Their whole existence had been bound up with British rule and administration. Their loyalty had been consistent, and their efficiency proved. Since the Montagu-Chelmsford reforms they were being slowly crushed out of employment owing to the Indianisation of the Service. The only way to stop the decline was to have a fixed number of appointments and maintain the percentage. The Anglo-Indian community, consisting of about 150,000 souls, were at present nobody's child. They fell between the two stools of two civilisations.

Sir Austen Chamberlain, while not accepting the wording of the amendment as suitable for insertion in the Bill, said that this House had perhaps a deeper moral responsibility for the Anglo-Indian community than for any other section of the people in India. Their situation might be made more difficult by the process of reforms. Something more was necessary than the vague words of the Bill to secure that these people were not edged out by degrees from the employment in which they had been so largely engaged. He begged the Government to see whether they could bring up a form of words which would meet the purpose.

Mr. Butler (Parliamentary Secretary, India Office) said that the report of the Joint Select Committee showed that special care and attention was given to this subject. It had been decided by administrative order to reserve to the Anglo-Indian community 8 per cent. of all vacancies to be filled by direct recruitment in the subordinate posts in the railway services. That, in general terms, consolidated the present position. The Government proposed to give practical effect to that resolution by including provisions in the instrument of instruction of the Governor-General and the Governor. So important was the subject that if it was thought that this did not bear out the wishes of the Joint Select Committee, or that some further safeguard was necessary, the Secretary of State would be ready to look into the matter again. The amendment would not meet the interests of the community as well as the method which the Government proposed.

Mr. Churchill complained that the Government undertaking was vague. The Government's highest aim seemed to be to stereotype the disastrous position to which the Anglo-Indians had descended since the Montagu-Chelmsford reforms. Parliament should go into such matters in great detail. He was told that 20,000 adult males of the community were without employment or the means to educate their children, and that they were invited to compete with coolie labour which had an entirely different standard of life. The Anglo-Indians had fallen into the pit, and the Government said they were to remain in the pit but they were not to fall to a deeper depth.

Mr. Amery said that the Anglo-Indians had made gallant efforts financed by themselves to set up agricultural communities some 200 miles from Calcutta. On these lines and in engineering and business they ought to find a place in India if they could be given a fresh start. When such a scheme was initiated they should take out of British funds—not Indian funds—a sum to supply a substantial endowment for a technical college or for something which would be an indication of this country's goodwill.

Lieut.-Col. Applin, speaking as the representative of the Anglo-Indians in this country, said that they had a right to their position on the railways and telegraphs of India. The whole community were horrified at the idea of 8 per cent. Forty per cent. was what they wanted and what they ought to have. The Anglo-Indians were the railway volunteers, and without them it was impossible to run the railways.

Sir Samuel Hoare (Secretary of State for India) said that the proportion of Anglo-Indians in the public service had fallen and was now something like 8 per cent. That was not due solely to the rivalry of other communities but to a great extent to the fact that owing to the rising standard of education the other communities were getting a bigger share in the appointments. The difficulty was to hold the balance between the various units. The Government had attempted to do that. Some months ago they had a full inquiry throughout India as to the share that ought to be given to the various communities in the public service. They came to a series of percentages which seemed to them to be fair. Those percentages were inserted in a resolution of the Government of India, and they intended that there should be no alteration in the percentages without the assent of the Govenor-General or the Governor. His Majesty's Government were prepared to make that clear either in the instrument of instruction or in the Bill itself. He thought that the words in the instrument of instruction appeared to be too general. He would look into the instrument and the body of the Bill to see if he could make the matter more explicit. The percentage of Anglo-Indians employed had, within his memory, been nothing like 40. Before the war it was about 15 per cent. The reason for the fall to 8 per cent. was the great reduction of employment on the railways owing to bad times. Another reason was the higher standard of education of the other communities. It would not be fair to continue a system which was imposed when the Anglo-Indian community was almost the only one from the education point of view competent to hold those posts. In their proposals the Government had put the percentage up a little but to go further would produce injustice towards the other communities. There would be 8 per cent. in the subordinate service and 9 per cent. in the higher service. Over and above these minima it was open to the Anglo-Indian community to get as many posts as they could in the competing examinations. The figure was the minimum, not the maximum. The Government had prevented the percentage going lower, and they would make that clear in the Bill.

Sir A. Chamberlain said that the Government had met his request.

Mr. Churchill expressed dissatisfaction with the Government reply. It was absurd to allow education alone to be a test for employment on railways. A sensible administration would prescribe something more than a literary examination.

The amendment was rejected by 232 votes to 52, and the clause was ordered to stand part of the Bill.

Questions in Parliament

A Level Crossing Accident Inquiry

Major Mills on April 4 asked the Minister of Transport whether an inquiry had been held by an official of his Ministry into the collision between a railway engine and a motor-car, which occurred on March 21 at the open level crossing in Jacob's Gutter Lane on the Fawley Light Railway; and whether he would require the Southern Railway Company to erect gates to guard the crossing.

Mr. Hore-Belisha.—One of my inspecting officers was recently appointed to investigate the arrangements existing at the Jacob's Gutter Lane and other ungated level crossings on this light railway. As a result he made certain recommendations for improving conditions, concerning which I am in communication with the railway company.

NOTES AND NEWS

Indian State Railways Annual Dinner.—This dinner will be held this year at the Café Monico, Shaftesbury Avenue, at 7 p.m. for 7.30, on Monday, June 3. As usual, subscriptions may be paid to Grindlay & Co., 54, Parliament Street, S.W.1. As attendances have been poor of recent years, it is hoped that all those who can possibly do so will make an effort to attend the dinner this year.

Cheaper Travel to Belgium.—By reason of the revaluation of Belgian currency, the L.N.E. and Southern Railways have been able to arrange considerable reductions in the fares to that country, as from Friday last, April 5. These amount in some cases to over 12 per cent. Fares to Germany and Switzerland via Belgium are similarly reduced in respect of the Belgian sections of the journeys.

Standard and Exceptional Charges.—As will be seen from the legal notice published on page 715, the Railway Rates Tribunal will sit at 10.30 a.m. on Tuesday, May 21, to review the standard and exceptional charges of each of the amalgamated companies. The accounts and statements relative to such review, lodged with the Tribunal by the companies, may be inspected at the office of the Registrar, 2, Clement's Inn, W.C.2. Notices of objection or submission must be filed with the Registrar on or before Friday, May 10.

Agreed Charges. — Thirty-eight more applications for the approval of agreed charges under the provisions of Section 37 of the Road and Rail Traffic Act, 1933, have been lodged with the Railway Rates Tribunal, as will be seen from the legal notice published on page 714. These applications may be inspected at the office of the Tribunal, 2, Clement's Inn, Strand, W.C.2, at the Railway Clearing House, London, and at 11 named centres outside London. A copy of each application (1s. post free) may be obtained from Mr. G. Cole Deacon, Secretary, Rates and Charges Committee, 35, Parliament Street.

Economic Aspects of Railway Signalling.—In accordance with a decision arrived at by the Council of the Institution of Railway Signal Engineers three years ago to hold one of the spring meetings in the provinces, the meeting arranged for Wednesday last was held at Manchester. The paper read and discussed bore the above title, and was given by Mr. A. J. Pearson. Among those, additional to the President (Mr. H. E. Morgan), who took part in the discussion were: Messrs. P. Lomas, H. M. Proud, W. S. Roberts, S. W. Spendlove, R. S. Griffiths, W. L. Cox (Liverpool Overhead Railway), W. R. Jones, and G. Morris. At the opening of the proceedings, the President announced that the summer meeting would be held in Belgium between Friday, June 21, and Tuesday, June 25.

Western Wagon to be Wound Up.—At an extraordinary general meeting lately held at Bristol, shareholders in the Western Wagon & Property Co. Ltd. approved a proposal for voluntary liquidation. The directors had stated that available assets would provide a considerable surplus after capital repayments.

Road Accidents.—The Ministry of Transport return for the week ended April 6 of persons killed or injured in road accidents is as follows. The figures in brackets are those for the corresponding week of last year:—

	Killed, including deaths resulting from previous accidents	Injured
England... ...	75 (110)	2,799 (3,509)
Wales	3 (8)	122 (179)
Scotland... ...	7 (8)	264 (347)
	85 (126)	3,185 (4,035)

The total fatalities for the previous week were 100, as compared with 120 for the corresponding period of last year.

"Rocket" Facsimile at South Kensington.—Yesterday (Thursday) at noon Mr. Hore-Belisha, the Minister of Transport, unveiled the full-sized copy of the famous Stephenson locomotive *Rocket* (made by Robert Stephenson & Co., the firm which built the original engine), which has been placed in position in the Science Museum, South Kensington, London. This copy, which represents the original as nearly as possible in form, materials, and workmanship, has been purchased by the museum authorities with the assistance of contributions from the four main-line railway companies.

Progress of Railway Bills.—The London Midland & Scottish Railway Bill was read the third time and passed in the House of Commons on April 8, and was read the first time in the House of Lords and referred to the Examiners on April 9. The Select Committee on Standing Orders decided on April 8 to allow an additional provision in the Southern Railway Bill relating to the superannuation fund to be inserted if the Committee on the Bill think fit. The Great Western Railway Bill, which has already been through the House of Commons, was on April 9 reported without amendment by the Unopposed Bills Committee of the House of Lords, and on April 10 was read the third time and passed and returned to the Commons.

Railways in Relation to Industry.—Mr. W. V. Wood, Vice-President, Finance and Service Departments, L.M.S.R., discussed, in an after-dinner speech to the Imperial Industries Club last Tuesday, some of the handicaps which threaten to mitigate the utility of railways to industry. He pointed out the unfair competition to which the companies are subjected by reason of the latitude allowed to other transport services, and the limitations imposed by Parliamentary control of rates. Mr. Wood insisted that the railways were not obsolete, but required a revision of the conditions under which they operate so that the country could have the benefit of the cheapest and most efficient transport possible for the development of its industries.

Model Railway Club Exhibition.—The Model Railway Club Exhibition is being held this year, as usual, at the Central Hall, Westminster, from Tuesday, April 23, to Saturday, April 27. Except on the opening day, when the doors will not be opened until 2 p.m., the exhibition hours will be 11 a.m. to 10 p.m. There will be the usual fine display of miniature railway equipment, including a fine collection of models from the Continent. Admission to the exhibition is 1s. 3d., and 7d. for children under 12.

London Transport Accounts.—In order to avoid again postponing the publication of the accounts, the London Passenger Transport Board is applying to Parliament for leave to introduce additional clauses in its Bill now before Parliament which would enable the board in effect to close its accounts in respect of each financial year on the basis of setting aside out of the revenue for each year to an interest suspense account such a sum as the board may deem adequate to meet interest on those considerations in respect of transferred undertakings which have not been determined by the arbitration tribunal before the close of such year.

L.N.E.R. Southern Scottish Area Ambulance Competition.—With a total of 243½ points, Dundee won in Glasgow, on April 5, the ambulance cup competition for the Southern Scottish Area of the L.N.E.R., eight teams participating. Mr. William Whitelaw, Chairman of the company, in presenting the cups and medallions, paid tribute to the efficiency of the competitors. Not only, he said, were they making themselves wonderfully proficient, but they were also encouraging the whole ambulance movement on the railways. It was no little satisfaction to the officers of the company to know that they had everywhere on the system bands of men willing and able to give efficient first aid should the need ever arise.

Robins Bolitho Ambulance Competition, G.W.R.—The annual contest for the trophy given by the late Mr. T. Robins Bolitho for teams of G.W.R. ambulance men employed at stations in West Cornwall took place at Penzance on April 2, when Dr. J. G. Morgan, of Liskeard, adjudicated. The arrangements were in the hands of Mr. R. G. Nodder, Divisional Ambulance Secretary. Four teams competed, one each from St. Ives and Penzance and two

from Truro, the team test being the treatment of imaginary injuries resulting from the fall of a workman through the glass roof of the station. The result of the competition, which was announced at a tea given by Mr. E. W. H. Bolitho, of Trengwainton, at the Railway Hotel, Penzance, was :—St. Ives, 112 marks ; Truro No. 1, 108½ ; Penzance, 103½ ; and Truro No. 2, 87. The Hon. J. H. Parker, District Traffic Manager, Plymouth, congratulated the St. Ives team on its success and remarked on the high standard of efficiency which had been displayed. The presentation of the trophy was made by Mrs. Bolitho.

L.N.E.R. Wharton Shield Competition.—Ambulance teams representing the six districts of the North Eastern Area Centre of the St. John Ambulance Association participated in the final competition for the Wharton Shield at Darlington, on Saturday, April 6. The winners were the Newcastle (Tyne Dock) team, who obtained 258 marks out of a possible 300. The shield and medals were awarded to the winning team by Mr. Thos. Hornsby, Divisional General Manager, North Eastern Area, York, president of the ambulance centre, who said that the movement was imbued with the spirit of service to others in the alleviation of pain and suffering, and, for that reason, he always regarded ambulance work as an important feature in railway organisation.

L.N.E.R. Boxing Championships.—The fifteenth amateur L.N.E.R. boxing championships were held at the Hamilton Hall, Great Eastern Hotel, Liverpool Street station, on Monday, April 8. The various events were followed with the greatest interest, and especially was this the case in the bantam-weight contest, which was won by L. Case, of Darlington, who was forced to box like a champion to dispose of R. Scott (Glasgow), the holder, in the semi-finals, but who soon stopped A. V. D. Godfrey (Ipswich) in the final. Sir Charles Batho, Bart., presented the cups, medals, &c., after each final.

British and Irish Traffic Returns

GREAT BRITAIN	Totals for 14th Week			Totals to Date		
	1935	1934	Inc. or Dec.	1935	1934	Inc. or Dec.
	£	£	£	£	£	£
L.M.S.R. (6,925¼ mls.)						
Passenger-train traffic...	416,000	422,000	− 6,000	5,239,000	5,417,000	− 178,000
Merchandise, &c. ...	480,000	390,000	+ 90,000	6,256,000	6,162,000	+ 94,000
Coal and coke ...	238,000	187,000	+ 51,000	3,697,000	3,695,000	+ 2,000
Goods-train traffic ...	718,000	577,000	+ 141,000	9,953,000	9,857,000	+ 96,000
Total receipts	1,134,000	999,000	+ 135,000	15,192,000	15,274,000	− 82,000
L.N.E.R. (6,339 mls.)						
Passenger-train traffic...	270,000	279,000	− 9,000	3,490,000	3,564,000	− 74,000
Merchandise, &c. ...	302,000	275,000	+ 27,000	4,328,000	4,386,000	− 58,000
Coal and coke ...	208,000	190,000	+ 18,000	3,373,000	3,454,000	− 81,000
Goods-train traffic ...	510,000	465,000	+ 45,000	7,701,000	7,840,000	− 139,000
Total receipts	780,000	744,000	+ 36,000	11,191,000	11,404,000	− 213,000
G.W.R. (3,749¼ mls.)						
Passenger-train traffic...	175,000	190,000	− 15,000	2,195,000	2,295,000	− 100,000
Merchandise, &c. ...	187,000	150,000	+ 37,000	2,510,000	2,425,000	+ 85,000
Coal and coke ...	98,000	67,000	+ 31,000	1,484,000	1,519,000	− 35,000
Goods-train traffic ...	285,000	217,000	+ 68,000	3,994,000	3,944,000	+ 50,000
Total receipts	460,000	407,000	+ 53,000	6,189,000	6,239,000	− 50,000
S.R. (2,172 mls.)						
Passenger-train traffic...	254,000	270,000	− 16,000	3,298,000	3,381,000	− 83,000
Merchandise, &c. ...	53,000	45,000	+ 8,000	818,000	864,500	− 46,500
Coal and coke ...	22,000	20,000	+ 2,000	480,000	515,500	− 35,500
Goods-train traffic ...	75,000	65,000	+ 10,000	1,298,000	1,380,000	− 82,000
Total receipts	329,000	335,000	− 6,000	4,596,000	4,761,000	− 165,000
Liverpool Overhead ... (6¼ mls.)	1,088	1,075	+ 13	15,222	15,032	+ 190
Mersey (4¼ mls.) ...	4,352	4,929	− 577	57,394	59,491	− 2,097
*London Passenger Transport Board ...	536,200	543,700	− 7,500	21,223,700	20,830,300	+ 393,400
IRELAND.						
Belfast & C.D. (80 mls.) pass.	1,727	3,394	− 1,667	23,815	26,021	− 2,206
,, ,, goods	494	488	+ 6	6,611	7,382	− 771
,, ,, total	2,221	3,882	− 1,661	30,426	33,403	− 2,977
Great Northern (543 mls.) pass.	8,550	12,700	− 4,150	112,650	107,650	+ 5,000
,, ,, goods	9,900	6,600	+ 3,300	119,950	116,500	+ 3,450
,, ,, total	18,450	19,300	− 850	232,600	224,150	+ 8,450
Great Southern (2,124 mls.) pass.	21,669	26,197	− 4,528	266,285	275,288	− 9,003
,, ,, goods	37,935	30,340	+ 7,595	498,016	447,044	+ 50,972
,, ,, total	59,604	56,537	+ 3,067	764,301	722,332	+ 41,969

* 40th week, the receipts for which include those undertakings not absorbed by the L.P.T.B. in the corresponding period last year ; last year's figures are, however, adjusted for comparative purposes Easter Monday week, 1934

British and Irish Railways Stocks and Shares

Stocks	Highest 1934	Lowest 1934	Prices Apl. 10, 1935	Prices Rise/Fall
G.W.R.				
Cons. Ord. ...	66½	48½	49	+1½
5% Con. Prefce. ...	118	109	114½	+2
5% Red. Pref. (1950)	115	107	110½	−
4% Deb.	117	105	113	+1
4½% Deb.	119	109	115½	−
4½% Deb.	129½	115¼	124½	+1
5% Deb.	135	126¼	136½	+1
2½% Deb.	75	64	76	−1
5% Rt. Charge ...	134 7/16	123¼	130½	+1
5% Cons. Guar. ...	132¾	121¾	127½	+1
L.M.S.R.				
Ord.	30½	19½	19	+1
4% Prefce. (1923)	64¼	41	47½	+3
4% Prefce. ...	87	69½	79½	+2
5% Red. Pref. (1955)	107	92½	100½	−
4% Deb.	114 1/8	100½	105	+1
5% Red. Deb. (1952)	118 11/16	111¼	116½	−
4% Guar.	106½	96¾	101	+1½
L.N.E.R.				
5% Pref. Ord. ...	24¾	13½	12	+1
Def. Ord.	11½	6⅞	6⅛	+⅛
4% First Prefce. ...	76	59½	60	+1½
4% Second Prefce.	47	25½	23½	+2
5% Red. Pref. (1955)	94½	80	81½	−
4% First Guar. ...	104	92	97½	+2
4% Second Guar.	97⅞	86½	88½	+1½
3% Deb.	90	74½	79	+1½
4% Deb.	114	99¼	104	+1½
5% Red. Deb. (1947)	117	108	112½	−
4½% Sinking Fund Red. Deb.	111¼	105¼	110½	−
SOUTHERN				
Pref. Ord.	90	63⅛	84	+2
Def. Ord.	32⅝	19	23½	+1½
5% Prefce. ...	118 5/16	107½	114½	+2
5% Red. Pref. (1964)	115¾	107½	114½	−
5% Guar. Prefce.	132	120¾	127½	−
5% Red. Guar. Pref. (1957)	119½	113	117½	−
4% Deb.	116½	103¼	112	+1
5% Deb.	134	124 13/16	134½	−
4% Red. Deb. 1962–67	113 11/16	105 9/16	111½	−
BELFAST & C.D.				
Ord.	6	5	5	−
FORTH BRIDGE				
4% Deb.	110	100	109½	−
4% Guar.	110	100	108½	−1
G. NORTHERN (IRELAND)				
Ord.	9¾	4 15/16	9	−
G. SOUTHERN (IRELAND)				
Ord.	25	12½	25	−
Prefce.	21½	13 15/16	26¼	+¼
Guar.	48	39	58¼	−½
Deb.	67	59	71	−2¾
L.P.T.B.				
4½% "A" ...	126	115	121½	−
5% "A"	135½	124½	131½	−
4½% "T.F.A." ...	113½	107½	112	−
5% "B"	131¾	118	126½	+2
"C"	97	73	99	+2
MERSEY				
Ord.	15¼	7	12	−
4% Perp. Deb. ...	93½	82½	94½	−
3% Perp. Deb. ...	66½	61½	69½	−
3% Perp. Prefce....	54	44½	52½	−

CONTRACTS AND TENDERS

Dorman Long & Co. Ltd. has secured an order from the South African Railways and Harbours Administration, through the offices of the High Commissioner in London, for check rail chairs to the value of £3,806 5s. 0d.

Mercury Arc Rectifiers for South Africa

In connection with extensions to the electrification of the South African Railways, the British Thomson-Houston Co. Ltd., through its South African representative, Wilson & Herd Limited, has just received from the Electricity Supply Commission the largest single contract ever placed for mercury arc rectifiers for inverted operation. The order includes eighteen rectifiers, which are to be installed in nine sub-stations, four on the Cato Bridge-Durban section, and five on the Glencoe-Volksrust section. The incoming supply will be 88,000 volts, 3-phase, 50 cycles, while the outgoing will be 3,000 volts d.c. Each sub-station will include a step down transformer with two secondary windings, each connected to a mercury arc rectifier. One rectifier will be arranged to supply power and the other arranged to return power to the a.c. system when the energy regenerated by the locomotives descending gradients exceeds the load demanded by other locomotives on the section. The two rectifiers will be so designed as to be interchangeable in function. Inverted operation of the rectifiers is effected by means of grid control; grid control will also be used to maintain the sub-station voltage constant under varying load conditions. The contract also includes a large number of high-speed circuit breakers similar to those at present used throughout the existing 3,000-volt electrified section of the South African Railways.

J. Lang & Sons Ltd. has received an order from the South Indian Railway for a 12½-in. screw-cutting lathe.

The Gloucester Railway Carriage & Wagon Co. Ltd. has received an order for 100 12-ton standard coal wagons from Denaby Main Collieries Limited, for Maltby collieries.

The L.M.S.R. announces that contracts have been placed with a Derby firm for improved goods facilities at Luton; with an Ilford firm for booking and parcels office accommodation at Mill Hill; and with a Bradford firm for additional warehouse and bond accommodation at Haydon Square, London.

The Associated Equipment Co. Ltd. has received orders from railway and railway-associated road transport operators as follow:—David MacBrayne (1928) Limited: one oil-engined passenger vehicle; Pickfords Limited: one oil-engined, eight-wheeled, Mammoth Major goods vehicle; and the Roumanian State Railways Administration: three Ranger bonneted-type, single-decked passenger vehicles.

Taylor Bros. & Co. Ltd. has received orders for 44 steel locomotive axles, 124 steel locomotive tyres and 1,000 steel carriage and wagon tyres for the Leopoldina Railway.

The South African Railways & Harbours Administration has recently placed orders as follow:—

Guest, Keen & Nettlefolds Limited: fishbolts with nuts and washers.
S.A. des Forges Usines et Fonderies Haine St. Pierre: C.S. buttresses.
S.A. Usines et Acieres Allard: C.S. buttresses.
Waterlow & Sons Ltd.: ticket cards.
Forges et Estampage de Burset Awans: check rail chairs.

The South African Railways & Harbours Administration is calling for tenders by April 25, through the offices of the High Commissioner in London, for 350 sets of points and crossings.

British Insulated Cables Limited, of Prescot, Lancashire, has received from the Metropolitan-Vickers Electrical Co. Ltd. an order for the overhead equipment required in connection with the contract recently secured by that company for the electrification of the Central Railway of Brazil. The order is for the equipment of approximately 112 single track miles of track within the suburban section of the Central Railway of Brazil at Rio de Janeiro, and includes the overhead equipment of the track, with transmission lines to substations and signal power supply, carried on track structures together with all rail bonding.

220 more L.M.S.R. Containers

The L.M.S.R. has decided to increase its stock of road-rail containers by a further 220 units, comprising 50 of the insulated type for meat traffic; 20 insulated for meat or fruit, fitted with bunkers for chemical refrigerant; 50 insulated and ventilated, fitted with water-ice bunkers for Scottish meat traffic; and 100 of a new design for conveyance of furniture. These additions will bring the total stock of L.M.S.R. containers up to 6,635. In addition, the company is to provide 120 new wagon chassis, of 12 tons capacity, for conveying by express trains the insulated containers referred to above, while the immediate conversion of 150 existing wagon chassis will make them suitable for the conveyance of either the new or existing meat containers.

J. Baker & Bessemer Limited has received from the Central Argentine Railway an order for 70 steel tyres for wagons.

G. H. Sheffield & Co. (Engineers) Ltd. has received an order for 12 patent Sheffield double-frame welded passenger bogies of 10 ft. wheelbase, for the Bengal Nagpur Railway. These bogies are for 68-ft. broad-gauge underframes, gross weight on rails 54 tons, and are to be fitted with Skefko axleboxes and Taylor light-type wheels, all to the specification and inspection of Sir John Wolfe Barry & Partners.

The directors of the Rohilkund & Kumaon Railway Co. Ltd. invite tenders, to be received by April 30, for the supply of four locomotives and tenders as per specification to be seen at the company's offices. For each specification a fee of £1 will be charged, which is not, in any circumstances, returnable.

The Bombay, Baroda & Central India Railway Company is prepared to receive up to May 3 tenders for the supply of bolts, nuts, rivets, washers, &c., and steel material (plates, angles, rounds, &c.). Tender forms and specifications may be obtained from The White Mansion, 91, Petty France, Westminster, S.W.1.

The Bengal-Nagpur Railway Company is prepared to receive tenders for 460 steel tyres for engines, tenders, and bissels. Specification and form of tender can be obtained at the company's offices, 132, Gresham House, Old Broad Street, London, E.C.2. Tenders must be submitted not later than noon on Wednesday, April 17.

Forthcoming Events

Apr. 12 (*Fri.*).—Institute of Transport (Leeds Graduate), at Church Inst., Albion Place, 7 p.m. Annual General Meeting.
Institute of Transport (Newcastle), at Royal Station Hotel, 7.30 p.m. Annual General Meeting.
Institution of Civil Engineers (Glasgow Students), at Inst. of Engineers and Shipbuilders, 7.30 p.m. Annual General Meeting. "Line and Level in the Setting-out of a Tunnel," by Mr. J. Robertson.
Institution of Mechanical Engineers, Storey's Gate, London, S.W.1, 6 p.m. "Aerodynamical Research and Hydraulic Practice," by Mr. A. Fage.
Mansion House Association on Transport, at Caxton Hall, Caxton Street, London, S.W.1, 3 p.m. Annual General Meeting.
Railway Students' Association (Edinburgh). Annual General Meeting.

Apr. 13 (*Sat.*).—Permanent Way Institution (Manchester-Liverpool), at Temperance Inst., Southport, 3 p.m. "R. B. S. Materials," by Mr. A. Preston.

Apr. 15 (*Mon.*).—Engineers' German Circle, at Inst. of Mechanical Engineers, Storey's Gate, London, S.W.1, 6 p.m. "The New Bridge over the Little Belt," by Dr.-Ing. O. Erlinghagen.
Institution of Mechanical Engineers (Graduates), Storey's Gate, London, S.W.1, 6.45 p.m. "Compressed Gas as a Locomotive Fuel," by Mr. J. C. Paterson; "The Treatment of Water for Locomotives," by Mr. A. D Smalley; "The Caprotti Valve Gear for Locomotives," by Mr. R. Purdie.
Royal Society of Arts, John Street, London, W.C.2, 8 p.m. "The Part Played by Rubber in Transport," by Mr. C. Macbeth.

Apr. 16 (*Tues.*).—Institute of Transport (London), at Inst. of Electrical Engineers, Savoy Place, W.C.2, 6 p.m. "Transport Developments in 1934," by Mr. R. Bell, C.B.E.
Institution of Civil Engineers, Great George Street, London, S.W.1, 6 p.m. "Billingham Branch Bridge," by Messrs. W. P. Haldane and G. Roberts; "Tees (Newport) Bridge, Middlesbrough," by Messrs. J. A. K. Hamilton and J. T. Graves.

Apr. 17 (*Wed.*).—Institution of Locomotive Engineers (London), at Inst. of Mechanical Engineers, Storey's Gate, S.W.1, 6 p.m. "Locomotive Testing Plants, with Special Reference to the Testing Plant at Vitry," by M. Pierre Place.
Institution of Civil Engineers (Students), Great George Street, London, S.W.1, 6.30 p.m. Annual General Meeting.

XUM

LEGAL AND OFFICIAL NOTICES

In the Court of the Railway Rates Tribunal.

Road and Rail Traffic Act, 1933. Agreed Charges

NOTICE IS HEREBY GIVEN that Applications for the approval of Agreed Charges under the provisions of Section 37 of the Road and Rail Traffic Act, 1933, short particulars of which are set out in the Schedule hereto, have been lodged with the Railway Rates Tribunal.

The said Applications may be inspected at the Office of the Tribunal, 2, Clement's Inn, Strand, London, W.C.2, at any time during office hours and at the following places:—

LONDON: Railway Clearing House, 123, Seymour Street, N.W.1.
BIRMINGHAM: District Goods Manager's Office, Snow Hill, Great Western Railway.
CARDIFF: Divisional Superintendent's Office, Great Western Railway.
EXETER: Western Divisional Superintendent's Office, Southern Railway.
LEEDS: District Goods Manager's Office, Wellington Street, London & North Eastern Railway.
LEICESTER: District Goods and Passenger Manager's Office, London Midland & Scottish Railway.
MANCHESTER: District Goods Manager's Office, Hunt's Bank, London Midland & Scottish Railway.
SOUTHAMPTON: Southern Divisional Superintendent's Office, Southampton West, Southern Railway.
YORK: Goods Manager's Office, London & North Eastern Railway.
ABERDEEN: District Goods and Passenger Manager's Office, London Midland & Scottish Railway.
EDINBURGH: District Goods and Passenger Manager's Office, Waverley Station, London & North Eastern Railway.
GLASGOW: Commercial Manager's Office, Central Station, London Midland & Scottish Railway.

A copy of each Application lodged with the Tribunal can be obtained from Mr. G. Cole Deacon, Secretary, Rates and Charges Committee, 35, Parliament Street, Westminster, London, S.W.1, price 1s., post free.

Notices of objection by any parties entitled to object to the approval of any of the said Agreed Charges must state concisely the grounds of objection and must be filed at the office of the Registrar, 2, Clement's Inn, Strand, London, W.C.2, on or before the 26th day of April, 1935, and a copy thereof on or before the same day served on or sent by registered post to Mr. G. Cole Deacon, at the above address. A separate Notice must be filed and served in respect of each Application.

Each Notice filed must be on foolscap size paper and must be stamped with an adhesive fee stamp for 2s. 6d. (which can be purchased at the office of the Tribunal only). If sent by post for filing each Notice must be accompanied by a Postal Order for 2s. 6d. payable to the Registrar when a stamp will be affixed at the office. A Notice by a Representative Body of Traders must contain a statement of the facts upon which such Body claims to represent a substantial number of traders interested in, or likely to be affected by the decision on, the application.

Four additional copies of each Notice must be lodged with the original at the office of the Registrar.

T. J. D. ATKINSON,
Registrar.

3rd April, 1935.

Number of Application and Date of Lodgment	Parties to Agreement	Nature of Agreed Charge
1935. No. 94—April 1, 1935	JONES STORES (DARWEN) LIMITED, 237, Duckworth Street, Darwen, and the G.W., L. & N.E., L.M. & S. and Southern Railway Cos. and L.P.T.B. This application by leave granted under Rule 4, relates also to Agreed Charges with other Registered Bacon Curers in Great Britain as specified therein.	Per pig. Live Pigs consigned to Registered Bacon Curers or their Agents.
1935. No. 95—April 1, 1935	ALLIED SUPPLIERS LIMITED, 179/189, City Road, London, E.C.1, and the G.W. and L.M. & S. Railway Cos.	Per ton. Eggs, Lard, Preserves, Provisions and Sugar.
1935. No. 96—April 1, 1935	ALLIED SUPPLIERS LIMITED, 179/189, City Road, London, E.C.1, and the L.M. & S. Railway Co.	Per ton. Multiple Shop Traffic (Provisions, &c.).
1935. No. 97—April 1, 1935	ENSIGN LIMITED, 88/89, High Holborn, London, W.C.1, and the G.W., L. & N.E., L.M. & S. and Southern Railway Cos.	Per ton. Photographic Apparatus, Chemicals and Accessories; Cinematograph Machines (Amateur); Wireless Apparatus; Battery Cells; Dry Accumulators; Automatic Delivery (slot) Machines; Corrugated Paper; Toys; Fancy Goods; Empties returned to Suppliers.
1935. No. 98—April 1, 1935	THE FREEDER CREPE PAPER MILLS LIMITED, Lea Bridge Road, London, E.10, and the G.W., L. & N.E., and L.M. & S. Railway Cos.	Per ton. Paper for Wrappering, Crepe Paper and articles manufactured from Paper such as Paper Serviettes and Paper Dish Covers.
1935. No. 99—April 1, 1935	GARDNER, TITLEY & WIDGERY LIMITED, 14/16, Queen Square, Bristol 1, and the G.W. and L.M. & S. Railway Cos.	Per ton. Groceries and Provisions.
1935. No. 100—April 1, 1935	J. G. GRAVES LIMITED, Sheffield, and the L. & N.E. and L.M. & S. Railway Cos. ..	Per ton. Furniture, General Stores, Wares and Empties returned to Suppliers.
1935. No. 101—April 1, 1935	THE GREAT UNIVERSAL STORES LIMITED, Devonshire Street, Ardwick, Manchester, and the Cheshire Lines Committee and the G.W., L. & N.E. and L.M. & S. Railway Cos. *Applicable also to traffic consigned by:—* Three Associated or Subsidiary Companies	Per consignment. Furniture, General Stores Wares and Advertising Matter (except when returned to Suppliers) in consignments which, under ordinary charging arrangements, would be charged under the "Small Parcels Scale."
1935. No. 102—April 1, 1935	THE GREAT UNIVERSAL STORES LIMITED, Devonshire Street, Ardwick, Manchester, and the L.M. & S. Railway Co. *Applicable also to traffic consigned by:—* Three Associated or Subsidiary Companies	Per consignment. Furniture, General Stores Wares and Advertising Matter in consignments which, under ordinary charging arrangements, would be charged under the "Small Parcels Scale."
1935. No. 103—April 1, 1935	A. GUINNESS, SON & CO. LTD., St. James's Gate Brewery, Dublin, and the G.W., L. & N.E., L.M. & S. and Southern Railway Cos. and L.P.T.B.	Per ton. Empty Casks and Bottles returned to the Trader's Birmingham Depot.
1935. No. 104—April 1, 1935	Do.	Per ton. Empty Casks and Bottles returned to the Trader's Bristol Depot.
1935. No. 105—April 1, 1935	Do.	Per ton. Empty Casks and Bottles returned to the Trader's Cardiff Depot.
1935. No. 106—April 1, 1935	Do.	Per ton. Empty Casks and Bottles returned to the Trader's Liverpool Depot.
1935. No. 107—April 1, 1935	Do.	Per ton. Empty Casks and Bottles returned to the Trader's London Depot.
1935. No. 108—April 1, 1935	Do.	Per ton. Empty Casks and Bottles returned to the Trader's Manchester Depot.
1935. No. 109—April 1, 1935	A. GUINNESS, SON & CO. LTD., St. James's Gate Brewery, Dublin, and the L. & N.E. and L.M.S. & S. Railway Cos.	Per ton. Empty Casks and Bottles returned to the Trader's Glasgow Depot.
1935. No. 110—April 1, 1935	SAML. HANSON & SON LTD., 14, Eastcheap, London, E.C.3, and the G.W. Railway Co.	Per ton. Confectionery and Preserves.
1935. No. 111—April 1, 1935	THE IOCO RUBBER & WATERPROOFING CO. LTD., Netherton Works, Anniesland, Glasgow, W.3, and the L. & N.E. and L.M. & S. Railway Cos.	Per ton. Cotton Goods, India Rubber Goods, Waterproof Clothing and Paper; Empties returned to Suppliers.
1935. No. 112—April 1, 1935	JACOBSEN WELCH & CO. LTD., Newton House, Paternoster Square, London, E.C.4, and the L. & N.E. and L.M. & S. Railway Cos.	Per ton. Stationery and Paper.
1935. No. 113—April 1, 1935	JOHN KAY LIMITED, Doreth House, Cowper Street, London, E.C.2, and the G.W., L.M. & S., L. & N.E. and Southern Railway Cos.	Per ton. Groceries, Preserves, and Provisions such as those included in Exceptional Rates Lists G, H, S and T as defined in the General Classification of Merchandise; Cigarettes, Eggs, Matches (Safety).
1935. No. 114—April 1, 1935	FREDERICK LAWRENCE LIMITED, Westbourne Grove, London, W.2, and the G.W., L. & N.E., L.M. & S. and Southern Railway Cos.	Per ton. Furniture and Furnishings, including articles such as Bedding, Mattresses, Carpets, Drapery, China and Glass, Hardware, Linoleum; Empties returned to Suppliers.
1935. No. 115—April 1, 1935	HENRY LISTER & SONS LTD., Troydale Mill, Pudsley, Yorks, and the L. & N.E. and L.M. & S. Railway Cos.	Per ton. Cloth (Textiles).
1935. No. 116—April 1, 1935	LOUIS MARX & CO. LTD., Waddam's Pool Works, Dudley, and the G.W. and L.M. & S. Railway Cos.	Per ton. Toys.
1935. No. 117—April 1, 1935	SCOTT & TURNER LIMITED, Gallowgate, Newcastle-on-Tyne, and the L. & N.E. Railway Co.	Per ton. Salines; Baking Powder; Cake Flour prepared; Gravy Salt; Jellies and Advertising Material.

Legal and Official Notices—*continued*

Number of Application and Date of Lodgment	Parties to Agreement	Nature of Agreed Charge
1935. No. 118—April 1, 1935	WITCHAMPTON BY-PRODUCTS LIMITED, Riverside Works, Weybridge, and the Southern Railway Co.	Per ton.
1935. No. 119—April 1, 1935	FLEMING, REID & CO. LTD., Greenock, and the L. & N.E. and L.M. & S. Railway Cos.	Firelighters.
1935. No. 120—April 1, 1935	J. G. GRAVES LIMITED, Sheffield, and the L. & N.E. and L.M. & S. Railway Cos. ..	Per package.
1935. No. 121—April 1, 1935	JOHNSON BROS. (DYERS) LTD., Bootle Dye Works, Liverpool, and the G.W., L. & N.E., L.M. & S. and Southern Railway Cos. and L.P.T.B.	Hosiery and Advertising Matter. Per package. Clothing, Drapery and General Stores Wares. Per ton. (i) Dyed and Cleaned Goods; (ii) Goods for Dyeing and Cleaning; (iii) Returned Empties.
1935. No. 122—April 1, 1935	D. JONES, DICKINSON & CO. LTD., Dowlais, South Wales, and the G.W. and L.M. & S. Railway Cos.	Per ton. Cake.
1935. No. 123—April 1, 1935	JOHN MARTIN LIMITED, Commerce House, 29-55, Middlesex Street, London, E.1, and the G.W., L. & N.E., L.M. & S. and Southern Railway Cos.	Per package. Mantles and Frocks.
1935. No. 124—April 1, 1935	McGROUTHER LIMITED, Cornton Road, Stirling, and the L. & N.E. and L.M. & S. Railway Cos.	Per package. Bacon, Margarine, Meat and Sausages.
1935. No. 125—April 1, 1935	MORGAN CRUCIBLE CO. LTD., Battersea Works, Church Road, London, S.W.11, and the G.W., L. & N.E., L.M. & S. and Southern Railway Cos.	Per package. Carbon and Copper Powder; Carbon Brushes (Metalware), Carborundum Cloth, Castings (Iron and Steel), Chamotte, Dextrine, Electrical Accessories, such as Carbon Blocks, Plates, Rings and Rods, Firebricks, Fireclay and Fireclay Ware, Founders' Dust, Graphite, Grease, Jointing Cement, Machinery, Paint, Plumbago and Clay Crucibles and Parts, Silicon Carbide, Silicon Carbide Bricks and Tubes and Wireless Parts.
1935. No. 126—April 1, 1935	J. PICK & SONS LTD., Leicester, and the L. & N.E. and L.M. & S. Railway Cos. ..	Per package. Knitted Outwear.
1935. No. 127—April 1, 1935	R. J. & A. R. PITCHERS LIMITED, Rock Place, Godalming, and the Southern Railway Co.	Per package. Woollen Goods.
1935. No. 128—April 1, 1935	SOMERVELL BROS. LTD., Kendal, and the L.M. & S. Railway Co.	Per package. Boots, Shoes and Advertising Matter.
1935. No. 129—April 1, 1935	THE SOUTH WESTERN DAIRIES LIMITED, Sherborne, Dorset, and the G.W. and Southern Railway Cos.	Per ton. Butter, Cheese, Cream and Honey.
1935. No. 130—April 1, 1935	STEAD & SIMPSON LIMITED, Belgrave Gate, Leicester, and the L. & N.E. and L.M. & S. Railway Cos.	Per package. Boots and Shoes.
1935. No. 131—April 1, 1935	S. & J. WATTS & CO., Manchester, and the Cheshire Lines Committee and the G.W., L. & N.E. and L.M. & S. Railway Cos.	Per package. Clothing, Drapery and General Stores Wares.

In the Court of the Railway Rates Tribunal.

Railways Act, 1921.
1933 Review of Standard Charges and Exceptional Charges.

NOTICE IS HEREBY GIVEN that the Railway Rates Tribunal will sit at 10.30 a.m. on Tuesday, the 21st May, 1935, in Court "A," Judges' Quadrangle, Royal Courts of Justice, London, W.C.2, to review the Standard Charges and Exceptional Charges of each of the Amalgamated Companies pursuant to the provisions of Section 59 of the Railways Act, 1921.

NOTICE IS FURTHER GIVEN that the Accounts and Statements relative to such Review lodged with the Tribunal by the said Amalgamated Companies may be inspected at the Office of the Registrar, 2, Clement's Inn, London, W.C.2, at any time during office hours. Copies of the Statements lodged by each of the four Amalgamated Companies (price 7s. 6d. each, or £1 10s. per set, post free) may be obtained, on prepayment, from Mr. G. Cole Deacon, 35, Parliament Street, Westminster, S.W.1.

Any body or person desiring to make any Objection or Submission relative to the Review must file a Notice of their or his Objection or Submission with the Registrar of the Court on or before Friday, 10th May, 1935. A separate Notice must be filed in relation to each Amalgamated Company.

Each Notice must be on foolscap size paper and must state concisely the ground or grounds of such Objection or Submission, and must be stamped with an adhesive fee stamp for 2s. 6d. (which can be purchased at the office of the Tribunal only). If sent by post each Notice must be accompanied by a Postal Order for 2s. 6d. payable to the Railway Rates Tribunal, when a stamp will be affixed at the office. Five additional copies of each Notice must be lodged with the original at the office of the Registrar.

Only the Amalgamated Companies and any body or person filing such Notice of Objection or Submission as aforesaid will be entitled to apply to be heard on the Review.

Dated this 10th day of April, 1935.

T. J. D. ATKINSON,
Registrar.

The Rohilkund & Kumaon Railway Company Limited.

THE Directors are prepared to receive Tenders for the supply of:—

4 LOCOMOTIVE ENGINES AND TENDERS,

as per Specification to be seen at the Company's Offices.

Tenders, addressed to the undersigned, and envelope marked "Tender for Locomotives," with name of firm tendering, to be lodged not later than noon on the 30th day of April, 1935.

For each Specification a fee of £1 will be charged, which cannot under any circumstances be returned.

The Directors do not bind themselves to accept the lowest or any Tender.

By Order of the Board,
W. R. IZAT,
Secretary.

237, Gresham House,
Old Broad Street,
London, E.C.2.
8th April, 1935.

Bengal-Nagpur Railway Company Limited

THE Directors are prepared to receive Tenders for:—

460 STEEL TYRES FOR ENGINES, TENDERS, AND BISSELS.

Specification and Form of Tender can be obtained at the Company's Offices, 132, Gresham House, Old Broad Street, London, E.C.2, on or after Monday, 8th April, 1935.

A fee of 10s. will be charged for each copy of the Specification, which is not returnable.

Tenders must be submitted not later than noon on Wednesday, 17th April, 1935.

The Directors do not bind themselves to accept the lowest or any Tender, and reserve to themselves the right of reducing or dividing the order.

By Order of the Board,
P. W. GIBBS,
Asst. Secretary.

RAILWAY TURNTABLE, 13 ft. 9 in. dia., standard gauge, new or secondhand, wanted.—Write, giving full particulars, Box 295, SELLS LIMITED, 14, Lancaster Place, W.C.2.

OFFICIAL ADVERTISEMENTS intended for insertion on this page should be sent in as early in the week as possible. The latest time for receiving official advertisements for this page for the current week's issue is noon on Thursday. All advertisements should be addressed to:—*The Railway Gazette*, 33, Tothill Street, Westminster, London, S.W.1.

FASTER L.N.E.R. SERVICE TO COPENHAGEN.—On and after May 14, the L.N.E.R. service from London via Harwich and Esbjerg to Copenhagen, and other stations in Scandinavia, will be accelerated by 4 hr. 40 min. The Scandinavian boat express which at present leaves Liverpool Street station at 7.42 p.m. every weekday, giving an arrival by sleeping car train in Copenhagen on the next morning but one, will leave at 4.10 p.m., and Copenhagen will be reached at 11.30 the next evening by diesel express service from Esbjerg. The new service will be made possible by the completion of the Little Belt Bridge, described briefly in our issue of May 4 last, and in detail and illustrated in *The Railway Engineer* of December, 1934. Simultaneously, the Danish State Railways hope to introduce the new three-car articulated diesel express trains—illustrated and described in the *Diesel Railway Supplement* issued with THE RAILWAY GAZETTE of August 10 last—in place of the existing steam trains. The new bridge and trains will enable the journey time between Esbjerg and Copenhagen to be reduced from 7½ hr. to 4½ hr., and there will be similar improved services to Aarhus, Aalborg, Fredericia, and other stations in Denmark. In view of the increasing popularity of the Harwich-Esbjerg route, and the heavy demand for accommodation on board the motor ships on the North Sea service, particularly at week-ends, Sunday services are to be operated this year in both directions during July and August, in addition to the all-the-year-round services every week-day.

XUM

Railway Share Market

The prospects of a good Budget, the big fall in unemployment figures and a substantial increase in the weekly traffic receipts issued on Wednesday, made a strong combination under the influence of which home railway stocks have been moving up. The traffic returns for the past week created a very favourable impression and although prices did not make any big further jump on the day they were issued it is probable that more leisured consideration by the market will lead to continued appreciation in the value of the junior stocks.

There is estimated to be a good prospect of the next few weeks' figures wiping out the Southern decrease and giving a satisfactory increase in its place. It is being pointed out that only a modest increase is required to bring the deferred stock on to the dividend-paying list. For income return the Southern preferred ordinary stock and L.M.S. 1923 preference stock are favoured in the Stock Exchange and for rise in capital value the Southern deferred stock probably is the most featured. The price of 24 reached on the issue of the traffic return compares with 30 at this time twelve months ago and with over 40 when the stock last was in receipt of dividend. London Passenger Transport Board " C " stock came into renewed request and recovered to within a fraction of par. This compares with 91 earlier in this year. The yield is about 10s. per cent. less than on the other stocks of the Board but there is estimated to be every prospect of a 4 per cent. dividend for 1935.

Foreign railway stocks shared in the improvement in markets and Argentine railway stocks received better support on the circulation in the market of a leaflet analysing the traffic figures and suggesting that steady improvement is taking place. Most prices for ordinary stocks and junior preference advanced. There was some exchanging out of B.A. Western 4½ per cent. preference into B.A. Great Southern 5 per cent. preference which gives a slightly higher yield. San Paulo ordinary stock which has come down 18 points this year was better on an estimated dividend of 3 per cent. against 4 per cent. last year.

Traffic Table of Overseas and Foreign Railways Publishing Weekly Returns

	Railways	Miles open 1934-35	Week Ending	Traffics for Week: Total this year	Traffics for Week: Inc. or Dec. compared with 1934	No. of Weeks	Aggregate Traffics to Date: Totals: This Year	Aggregate Traffics to Date: Totals: Last Year	Aggregate Traffics to Date: Increase or Decrease	Shares or Stock	Prices: Highest 1934	Prices: Lowest 1934	Prices: Apl. 10, 1935	Prices: Yield % (See Note)
				£	£		£	£	£					
South & Central America.	Antofagasta (Chili) & Bolivia	830	7.4.35	10,910	— 110	14	169,620	178,610	— 8,990	Ord. Stk.	26¾	19	16	Nil
	Argentine North Eastern ..	753	6.4.35	7,788	+ 146	40	290,194	330,927	— 40,733	,,	11	6⅞	7	Nil
	Argentine Transandine ..	111	—	—	—	—	—	—	—	A. Deb.	52	45	40	10
	Bolivar	174	Mar., 1935	7,100	— 600	13	19,550	20,650	— 1,100	6 p.c. Deb.	10	6½	10	Nil
	Brazil	—	—	—	—	—	—	—	—	Bonds.	13⅝	10 7/16	13	3 15/16
	Buenos Ayres & Pacific ..	2,806	6.4.35	102.779	+ 9,625	40	3,040,292	3,387,860	— 347,568	Ord. Stk.	16½	8½	6	Nil
	Buenos Ayres Central ..	190	17.3.35	$92,000	+ $16,800	37	$4,117,900	$4,053,800	+ $64,100	Mt. Deb.	23	10	21½	Nil
	Buenos Ayres Gt. Southern	5,085	6.4.35	162,685	+ 8,501	40	5,790,254	6,434,009	— 643,755	Ord. Stk.	35	22	22	Nil
	Buenos Ayres Western ..	1,930	6.4.35	53,223	— 8,450	40	1,780,124	2,107,476	— 327,352	,,	27½	18½	18½	Nil
	Central Argentine	3,700	6.4.35	130,683	+ 11,426	40	4,738,009	5,298,599	— 560,590	,,	23	13½	14½	Nil
	Do.	—	—	—	—	—	—	—	—	Dfd.	14	7	7	Nil
	Cent. Uruguay of M. Video	273	6.4.35	11,220	— 7,536	40	562,243	657,278	— 95,035	Ord. Stk.	15½	8	6½	Nil
	Do. Eastern Extn.	311	6.4.35	2,284	— 1,789	40	76,701	132,266	— 55,565	—	—	—	—	—
	Do. Northern Extn.	185	6.4.35	1,544	— 1,589	40	42,433	72,988	— 30,555	—	—	—	—	—
	Do. Western Extn.	211	6.4.35	554	— 715	40	31,447	65,163	— 33,716	—	—	—	—	—
	Cordoba Central	1,218	6.4.35	25,720	— 1,080	40	1,131,940	1,346,620	— 214,680	Ord. Inc.	6	3	3	Nil
	Costa Rica	188	Jan., 1935	16,816	+ 2,798	30	115,867	128,984	— 13,117	Stk.	30¾	23½	31½	6⅜
	Dorada	70	Feb., 1935	11,000	+ 700	8	21,500	22,000	— 500	1 Mt. Db.	103	95	104½	5¾
	Entre Rios	810	6.4.35	11,177	+ 1,189	40	496,861	501,267	— 4,406	Ord. Stk.	21½	12	12	Nil
	Great Western of Brazil ..	1,082	6.4.35	7,700	+ 400	14	143,400	137,200	+ 6,200	Ord. Sh.	7⅝	⅝	½	Nil
	International of Cl. Amer.	794	Feb., 1935	$409,078	— $100,563	8	$838,555	$970,374	— $131,819	—	—	—	—	—
	Interoceanic of Mexico ..	—	—	—	—	—	—	—	—	1st Pref.	1/-	1/-	½	Nil
	La Guaira & Caracas ..	22¾	Mar., 1935	4,040	+ 710	13	10,540	10,910	— 370	Stk.	12¾	7⅝	8½	Nil
	Leopoldina	1,918	6.4.35	25,422	+ 932	14	332,902	325,544	+ 7,358	Ord. Stk.	14⅝	7	5	Nil
	Mexican	483	31.3.35	$354,400	— $116,500	13	$3,003,300	$2,957,200	+ $46,100	,,	3¼	1½	1½	Nil
	Midland of Uruguay ..	319	Mar., 1935	6,298	— 3,225	39	91,386	87,516	+ 3,870	,,	1½	½	1½	Nil
	Nitrate	401	30.3.35	4,627	— 7,320	13	35,118	48,605	— 13,487	Ord. Sh.	32/32	51/-	2¼	Nil
	Paraguay Central	274	6.4.35	7,150	+ 3,540	40	201,180	128,530	+ 72,650	Pr. Li. Stk.	84	67	65	9¼
	Peruvian Corporation ..	1,059	Mar., 1935	57,510	— 9,467	39	557,156	506,929	+ 50,227	Pref.	14½	8	7¼	Nil
	Salvador	100	30.3.35	¢39,000	+ ¢7,800	39	¢800,502	¢798,383	+ ¢2,119	Pr. Li. Db.	75	70	70	7⅛
	San Paulo	153½	31.3.35	36,747	+ 9,948	13	428,089	394,212	+ 33,877	Ord. Stk.	86	67	63	6⅝
	Taltal	164	Mar., 1935	6,054	+ 2,019	39	26,885	22,447	+ 4,438	Ord. Sh.	2⅛	1 7/16	1 1/2§	6 11/16
	United of Havana	1,365	6.4.35	28,860	— 2,430	40	930,766	743,490	+ 187,276	Ord. Stk.	6	2	3	Nil
	Uruguay Northern	73	Mar., 1935	828	— 327	39	9,835	10,546	— 711	Deb. Stk.	6¼	3	4½	Nil
Canada.	Canadian National	23,735	31.3.35	890,468	— 85,151	13	7,675,280	7,473 289	+ 201,991	—	—	—	—	—
	Canadian Northern ..	—	—	—	—	—	—	—	— 4 p.c.	Perp. Dbs.	78¼	51½	62½	6⅝
	Grand Trunk	—	—	—	—	—	—	—	—	4 p.c. Gar.	104½	97¼	101½	3 15/16
	Canadian Pacific	17,211	31.3.35	587,000	— 66,800	13	5,287,600	5,497,400	— 209,800	Ord. Stk.	18 5/16	11 1/16	10	Nil
India.†	Assam Bengal	1,329	9.3.35	28,687	— 2,677	49	1,341,971	1,197,696	+ 144,275	Ord. Stk.	88½	72	81½	3 11/16
	Barsi Light	202	16.3.35	2,062	— 450	50	131,340	142,181	— 10,841	Ord. Sh.	10 4½	98¾	99½	6
	Bengal & North Western ..	2,113	23.3.35	45,213	— 11,997	25	1,295,904	1,190,657	+ 105,247	Ord. Stk.	297½	262	293½	5 9/16
	Bengal Dooars & Extension	161	16.3.35	2,428	+ 214	50	148,861	145,243	+ 3,618	,,	125¼	124	124½	5⅝
	Bengal-Nagpur	3,269	2.3.35	125,625	— 3,967	48	5,480,463	5,099,097	+ 381,366	,,	105½	96	102½	3⅞
	Bombay, Baroda & Cl. India	3,072	30.3.35	148,875	— 27,600	52	8,268,600	8,004,525	+ 264,075	,,	115	108½	114½	5¼
	Madras & South'n Mahratta	3,230	9.3.35	104,400	— 17,247	49	5,218,167	5,345,694	— 127,527	,,	131	122¾	126½	7½
	Rohilkund & Kumaon ..	572	23.3.35	10,691	— 3,079	25	266,479	258,330	+ 8,149	,,	263	250	284½	5⅝
	South India	2,526	16.3.35	79,167	+ 4,352	50	3,965,562	3,849,997	+ 115,565	,,	119	115	116	6⅞
Various.	Beira-Umtali	204	Jan., 1935	64,519	+ 19,077	17	245,504	194,466	+ 51,038	—	—	—	—	—
	Bilbao River & Cantabrian	15	Feb., 1935	2,061	+ 365	8	4,310	3,243	+ 1,067	—	—	—	—	—
	Egyptian Delta	621	20.3.35	5,737	— 195	50	233,987	229,981	+ 4,006	Prf. Sh.	21 5/16	15¼	17⅛	5⅝
	Great Southern of Spain ..	104	30.3.35	2,249	+ 836	13	24,533	27,409	— 2,876	Inc. Deb.	4	3½	3½	Nil
	Kenya & Uganda	1,625	Jan., 1935	239,686	+ 47,245	4	239,686	192,441	+ 47,245	—	—	—	—	—
	Manila	—	—	—	—	—	—	—	—	B. Deb.	50	33	45½	7 11/16
	Mashonaland	913	Jan., 1935	121,793	+ 39,115	17	464,048	359,731	+ 104,317	1 Mg. Db.	101	91¾	102	4⅞
	Midland of W. Australia ..	277	Feb., 1935	11,096	— 1,869	34	110,221	108,715	+ 1,506	Inc. Deb.	100	93	96½	5 5/16
	Nigerian	1,905	16.2.35	47,693	— 12,443	46	1,774,798	1,601,007	+ 173,791	—	—	—	—	—
	Rhodesia	1,538	Jan., 1935	194,575	+ 45,831	17	751,227	614,138	+ 137,089	4 p . Db.	104⅞	97½	105	3 13/16
	South African	13,217	16.3.35	525,909	+ 55,586	50	25,905,571	22,797,976	+3,107,595	—	—	—	—	—
	Victorian	6,172	Dec., 1934	870,315	+ 101,872	26	4,751,974	4,536,635	+ 215,339	—	—	—	—	—
	Zafra & Huelva	112	Feb., 1935	10,521	+ 175	8	21,904	23.255	— 1,351	—	—	—	—	—

NOTE.—Yields are based on the approximate current prices and are within a fraction of 1/16

† Receipts are calculated @ 1s. 6d. to the rupee. § ex dividend. Salvador receipts are in currency

The variation in Sterling value of the Argentine paper peso has lately been so great that the method of converting the sterling weekly receipts at the par rate of exchange has proved misleading, the amount being overestimated. The statements from July 1 onwards are based on the current rate of exchange and not on the par value